THE IRON TRADE REVIEW

VOLUME XXXIX CLEVELAND, AUGUST 16, 1906 NUMBER 32

HEAVY BUYING

AND HIGHER PRICES ARE STILL FEATURES,

While Warnings Against Excitement are Heard.—Large Sales of Basic, Bessemer and Foundry Grades.

The pig iron market has been in a rather excited condition in some centers during the past few days, and words of caution from conservative interests, frequently heard of late, are now spoken with pronounced emphasis. There are already signs that some consumers are buying, or trying to buy, ahead of their real requirements. While interest in finished materials is not so great as in pig iron, the mills are extremely busy and orders are coming in satisfactorily, while specifications are of record-breaking proportions.

High Prices for Pig. Prices in pig iron are still advancing, especially for spot shipment. On southern grades it is doubtful whether iron can be bought at less than $15 Birmingham for this year's delivery. Buyers are placing their orders and taking the iron without much attention being paid to analysis. Almost anything will be accepted, provided it can be received promptly. The principal sales of the week were about 50,000 tons of various grades in the Chicago district, some 60,000 tons of basic in the Philadelphia district and 100,000 tons of Bessemer in Youngstown and Pittsburg for delivery in the first quarter and first five months of next year, the price of all but 10,000 tons of the Bessemer being $17.75, valley furnace. Many foundries are being compelled to buy spot iron in advance of prices, as high as $19.95 being paid in Philadelphia. The supply of Bessemer in the valleys is extremely small, and is being held at $18 to $18.25 at the furnace for this year's delivery.

Sheet Bar Capacity. The scarcity of crude steel continues, but steps are being taken to increase the production of sheet bars and relief is promised at an early date. The principal manufacturer of sheets has increased its production at Sharon and Muncie, and will soon place other mills in operation. The Carnegie Steel Co. has practically all the orders it can take on plates for this year. Other producers are able to take new business, but are falling behind on deliveries.

Building at St. Louis. Mills rolling structural shapes are receiving specifications in great volume, but new business is not especially large. The building boom at St. Louis is calling for a large tonnage. Contract for a building involving 4,500 tons of shapes has just been awarded, office buildings which will take 50,000 tons are in course of construction and about 20,000 tons will be needed for numerous small structures in that city.

Demand for Track Supplies. The demand for track supplies is exceedingly heavy, especially for spikes, angle bars and bolts. There is heavy buying of merchant pipe. The usual summer lull in wire products is being felt to a very limited extent this year.

Old Material Improving. The coke market is brisk, and there is danger of a scarcity of supply. Prices are firm. The scrap market shows continued improvement, but the disposition in some places to advance too rapidly is not relished by buyers. The Panama Canal Commission will soon have about 8,000 tons of old material for sale.

Building operations during July, as gauged by building permits, showed a decrease of four per cent over those of July, 1905. This was chiefly due to a heavy falling off in New York.

CENTENNIAL WEEK AT CONNELLSVILLE.

Connellsville, Pa., the heart of the greatest coke producing region in the world, is this week in the midst of its centennial celebration, beginning on Tuesday and continuing for four days. Gov. Pennypacker, of Pennsylvania, opened the festivities by pressing a button at Harrisburg, the state capital, and following the response at the coke city every whistle in the region, together with bells and horns and the firing of cannon, created a 15-minute pandemonium.

The city is gaily decorated and elaborate plans are being carried out in honor of the anniversary. One of the notable features is an immense double arch of coke erected by the H. C. Frick Coal & Coke Co., at Main and Pittsburg streets, known as "Brimstone" corner. The base of the arch rests upon immense blocks of coal and the whole is studded with electric lights, presenting a brilliant spectacle at night.

The chief event of the first day's celebration, Tuesday morning, was a chorus of 1,500 school children, dressed in red, white and blue, and arranged in the form of the flag, on the steps of the Carnegie public library. The address of welcome was delivered by Burgess A. D. Soisson and Judge E. H. Reppert made the centennial address. A parade representing the historical development of the region passed through the principal streets.

New Birmingham Plant.—T. E. E. Bartlett announces the formation of the Southland Corporation, the objects of which company will be to manufacture sugar machinery, engines and make heavy steel castings. He states that he will be associated with David Blake and Edwin A. Hine, of New York, and that in addition to acquiring the machinery manufacturing plant of the Bartlett-Tewksbury Co. at East Birmingham, Ala., a large engine works and steel casting plant, to cost $125,000, will be erected at once adjoining that plant, contracts having been let to the Southern Bridge Co. He states further that there is room in this district for large steel casting plants and machinery works.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Heavy Sales of Bessemer for Next Year.—Mills Extremely Busy.

Office of THE IRON TRADE REVIEW, 521 PARK BUILDING, Aug. 14

While the spot light is still directed on pig iron as the leading figure in the caste, the various branches of finished material make up a strong chorus in which there are no favorites. The production is enormous, but the demand is greater, the natural result being that producers are getting further behind in their deliveries and in many instances have refused to place further business on the books for the remainder of the year, although a willingness to go further ahead than usual and accept obligations running through the first half of next year has developed and considerable business of this nature has been taken.

The most important feature of this advance business was transacted since the meeting of the Bessemer Furnace Association in Cleveland when the price for pig iron through the first half of next year was established as far as the producers in the association were concerned and 60,000 tons of Bessemer pig iron for delivery during this period was sold to the Youngstown Sheet & Tube Co., and 30,000 tons, for delivery during the first quarter of next year was sold to the Jones & Laughlin Steel Co., both consumers paying $17.75, valley furnaces.

The Youngstown company also purchased 10,000 tons of Bessemer from a furnace outside of the association, delivery first quarter of 1907, at $17.50.

Although regrets that such conditions are likely are freely expressed the approach of a runaway market in pig iron is indicated on account of the very strong demand for all grades and the extreme scarcity of material for anything like nearby delivery.

At the same time a conservative view of the situation is taken and every effort is being made to control the market and maintain a steady, even run of the present prosperity and prevent a period of depression and slow business which inevitably follows boom conditions and inflated valuations.

There are very few finished lines in which deliveries can be made on new business inside of sixty days and this delivery is the exception rather than the rule. The summer months, usually dull on account of hot weather and vacation periods, together with a letting up of the strain, have been exceptionally heavy both in the number of new contracts being placed with the mills and the tonnages specified against existing obligations of the producers of finished material. The demand for sheared and universal plates and structural material exceeds the capacity of the mills and in these lines as well as in steel bars producers have practically enough business on the books to carry them to the first of the year and in some cases business will have to be carried over.

The steel car companies have placed considerable business for next year with the mills to take care of contracts for new rolling stock placed by the railroad companies and the filled up condition of lake ship yards due to recent heavy contracting for new lake tonnage, has placed the mills in a position of independence which was not anticipated as near back as two months ago, when producers of plates were seeking business and there was some talk of price shading in order to obtain it.

The situation as far as it related to semi-finished material has not improved to any extent and it is next to impossible to secure small billets and sheet bars, although steps to relieve the situation in the latter case have been taken during the present week by the leading interest.

With the approach of harvest time a new feature has developed and considerable difficulty in the way of a car shortage will have to be dealt with. The procrastinators are looking ahead of next summer, nearly a year off, and are trying to discount the probable effect of the political activity at that time.

Pig Iron.—The supply of pig iron for delivery during the present quarter and the last three months of the year is held in very few hands and is scarce at that, this condition becoming more evident every week. The amount of business being done for delivery during the first and second quarters of next year is surprising, the buying being at least two months ahead of the usual time and present prices are as a rule being quoted. The Bessemer Furnace Association at a meeting in Cleveland estimated the amount of pig iron it would have for the first half of 1907 and fixed its price for this delivery at $17.75, valley furnaces, and since that time has sold to the Youngstown Sheet & Tube Co., 60,000 tons and for the first five months of 1907 to the Jones & Laughlin Steel Co., 30,000 of Bessemer for the first quarter at that figure. For delivery during the remainder of the present year the association has no iron whatever, and other furnace interests are holding at $18, valley, on large lots and have secured $18.25, valley, on small lots, of Bessemer. Basic pig iron is held at $17.50 to $17.75 for the remainder of the year. Northern No. 2 foundry iron is quoted $17.75 to $18, valley furnaces, or $18.60 to $18.85, delivered, Pittsburg. The Midland Steel Co.'s new furnace will blow in Sept. 1. Southern No. 2 foundry has again advanced and during the past week 1,500 tons was sold to Cleveland parties at $15, Birmingham. Southern forge iron is quoted at $12.75 to $13, Birmingham. A local interest sold 6,000 tons of northern Bessemer iron at $18.65, valley, for third quarter delivery. We quote:

Bessemer Valley	18.00 to 18.25
Bessemer, Pittsburg	18.85 to 19 10
No. 1 Foundry, Pittsburg	19.10 to 19.35
No. 2 Foundry, Pittsburg	18.60 to 18.85
Gray Forge, Pittsburg	17.35 to 17.60
Basic, Valley	17.50 to 17.75
Basic, Pittsburg	18.35 to 18.60

Ferro-Manganese.—For October and November delivery, Pittsburg, ferro-manganese, foreign 80 per cent, has been sold at $85 and for September delivery $87.50 to $90 is quoted.

Steel.—The supply of semi-finished steel has not improved to any appreciable extent, although an effort is being made to bring this about, particularly in regard to sheet bars on which deliveries are now being made on June specifications. One offer of 5,000 tons of sheet bars was refused by a mill on the base of $29, Pittsburg, and sales have been made at figures as high as $29.50, Youngstown, with small billets at the same figure. The extreme scarcity is due partly to the strong demand for small billets and sheet bars on contract, but the chief reason is the pressure on finishing mills of producers. We quote Bessemer billets nominally at $27.50 and open-hearth $29, Pittsburg, with very few, except in odd lots to be had at this price.

Skelp.—There has been some little movement in skelp, but it has been small, it being hard to find a market at present quotations, on account of the low prices being obtained for pipe. We quote as follows on light gauges and narrow widths:

Bessemer grooved, 1.57½c to 1.60c; sheared, 1.65c to 1.70c; basic grooved, 1.65c to 1.70c; sheared, 1.70c to 1.75c; iron skelp, grooved, 1.70c to 1.75c; sheared, 1.80c to 1.85c.

Muck Bar.—We have been unable to learn of any transactions in muck bar, but quote a nominal market of $30, Pittsburg, on all pig metal bar.

Hoops and Bands.—Until after the annual meeting of the National Cooper-

age Association, now in session at Chicago, there will not be much new business, although specifications against present contracts are fair and prices steady. We quote:

Hoops, 1.90c in carload lots, and 2c on less than carload lots, bands, 1.50c base, half extras as per standard steel card. Prices f. o. b. Pittsburg.

Structural Material.—What summer idleness is evident is created by the fact that the steel interests have practically nothing to sell and consumers are on vacations. The mills are from two to three months behind on deliveries, and new contracts are coming in satisfactorily. Fabricating shops are running full and construction companies have about as much business as they can handle during the remainder of the year, and for their material contracts were placed some time ago. New business accepted now depends entirely upon the capacity of their shops to turn out the work. We quote:

Beams and channels, 15 in., and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles from three to six inches, inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Plates.—The Carnegie Steel Co. is practically sold up for the year. Other mills are in excellent shape as far as business on the books is concerned, but they are all behind on deliveries with the possible exception of special business. We quote prices unchanged as follows:

Tank plate ¼ inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill, Pittsburg. Light plate schedule, No. 10, 1.70c; Nos. 11-12, 1.75c; Nos. 13-14, 1.80c; Nos. 15-16, 1.90c. Extras on the regular plate schedule are as follows per 100 pounds, boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c: marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates, varying not more than four inches, in width at ends, narrowest end not being less than 30 inches, 0.10c; complete circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gauges under ¼ inch to and including 3-16 inch plates on thin edges, 0.10c; under 3-16 inch to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—New inquiry is good and specifications are very heavy, but the mills are from six to eight weeks, and in some cases further behind on deliveries, on account of inability to operate to capacity because of the limited supply of semi-finished steel. The leading interest this week started 10 of the 20 mills at Sharon and the remainder will start next week. Midland mill, Muncie, Ind., was also started after a long shutdown. The demand for both black and galvanized sheets exceeds the output of the mills, and, while no definite action has been taken as yet, there is talk of a probable advance in prices. Consumers are specifying as far ahead as the producers will permit them under their contracts. We quote:

Black steel sheets, box annealed, cold rolled, one pass: Nos. 11-12, 2.10c; Nos. 13-14, 2.15c; Nos. 15-16, 2.20c; Nos. 17-21, 2.25c; Nos. 22-24, 2.30c; Nos. 25-26, 2.35c; No. 27, 2.40c; No. 28, 2.50c; No. 29, 2.65c; No. 30, 2.75c. Galvanized, Nos. 10-11, 2.45c; Nos. 12-14, 2.55c; Nos. 15-16, 2.65c; Nos. 17-21, 2.80c; Nos. 22-24, 2.95c; Nos. 25-26, 3.15c; No. 27, 3.35c; No. 28, 3.55c; No. 29, 3.80c; No. 30, 4.05c. Corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation; $3.10 per square for No. 28 galvanized, 2½-inch corrugation. Quotations f. o. b. Pittsburg on large lots.

Tin Plate.—The new contract period is past, but the specifications against existing contracts are very heavy and deliveries are from two to three months behind, due partly to the heavy business but mostly to the percentage of mills in operation, a large part being down on account of inability to secure semi-finished steel.

We quote: $3.75 per base box, f. o. b. Pittsburg, 14 x 20 100-pound cokes, terms 30 days, less two per cent off for cash in ten days.

Merchant Bars.—The market is firm at the advanced price of 1.60c, Pittsburg, and Pittsburg base for outside shipment and, while the railroads have been buyers during the week, a large part of the business during this period went direct to the general trade or to jobbers and a still further advance, probably $2 per ton, is not improbable within a short time. There has been an unusually heavy demand in the west. We quote:

Common iron bars, 1.60c, Pittsburg, in carload lots, 1.65c in less than carloads; Bessemer steel bars, 1.50c; plow and cultivator, 1.50c net; channels, angles, zees and tees, under three inches, 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds, of a size, 0.30c advance.

Steel Bars.—There is a very heavy demand for steel bars, new business is good and the specifications against contracts are particularly heavy and while mills are taking care of their trade, there has been no effort to secure a large amount of new business owing to the filled-up condition of the order books for a long period ahead. The smaller companies have advanced their prices, but the leading producers are resisting a similar move, holding at 1.50c base, preferring to maintain present conditions, which are better than they have been for several years. We quote:

Cold rolled and ground shafting, 50 per cent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c to 1.80c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.05c to 2.10c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ inch by ½ inch, 1.65c base half extra tire list. Iron finished tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.50c base; half extra steel card.

Merchant Pipe.—There is an immense amount of new inquiry for merchant pipe, and large tonnages are being booked. During the past week several good line pipe contracts were closed for six and eight-inch pipe, among the largest being the Ohio Fuel Gas Co., for Ohio points, 15 miles; Deming Investment Co., for Indian Territory, 27 miles, and the Philadelphia Co., for Pittsburg district, 10 miles, aside from numerous smaller orders. The discount in large lots is 81 per cent and 5 off. We quote the following official discounts, consumers' carloads, with jobbers' carloads one point higher:

	Steel		Iron	
Consumer's Carloads	Black	Galv.	Black	Galv
⅛ and ¼ inch	71	55	67½	51½
⅜ inch	73	59	69½	55½
½ inch	75	63	71½	59½
⅝ to 6 inches	79	69	76	66
7 to 12 inches	74	59	71	55½
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	64	52	60½	48½
½ to 4 inches	71	59	67½	55½
4½ to 8 inches	67	55	63½	51½
Double extra strong plain ends, ⅜ to 8 inches	60	40	56½	42½

Boiler Tubes.—Conditions are good and business is very satisfactory in boiler tubes, with prices unchanged as follows:

	Steel	Iron
1 to 1¼ inches	50	45
1¼ to 2¼ inches	62	45
2¼ inches	64	50
2¾ to 5 inches	70	57
6 to 13 inches	62	45

Less than carload lots two points less.
2¼ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Wire and Wire Nails.—The summer lull in wire products, while it is being felt, is not as great by any means as during the same time in other years, and the prospects for continued, large and

steady operation and a marked increase over the first half of the year are of the best. Prices are unchanged, as follows:

Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $1.90, and less than carload lots, $2; painted barb wire, $2 for jobbers in carloads; retailers in carloads, $2.05, and less than carloads, $2.15, with 30c for galvanizing; plain wire, $1.70 to jobbers and $1.75 by carload.

Coke.—A scarcity of both foundry and furnace coke of standard grades has developed to a considerable extent, and the market is strong at $3.15 to $3.25 on foundry coke and $2.70 to $2.80 on furnace, and under present conditions it would not be at all surprising to see a marked advance within the next three or four weeks.

The Sheet Metal Workers'. Association held its national convention last week at Indianapolis. One of the subjects discussed was that of the deterioration of tin plate used for roofing, and in this connection it was decided to put forth greater efforts to educate the public in the use of reliable materials. Edwin L. Seabrook, of Camden, N. J., was elected president.

No acceptable bids were received for the plant of the Marinette Gas Engine Co., of Chicago Heights, Ill., in the bankruptcy proceedings before Referee Frank L. Wean at Chicago on Tuesday this week and the matter was continued until August 24 for further bids.

The Ohio works of the Carnegie Steel Co. at Youngstown, O., went on sheet bars Sunday night, Aug. 12. The order of bars received will take from two to three weeks to fill. The Ohio works has been making rails exclusively since early last spring.

Canada paid the following bounties for the first eleven months of the 1906 fiscal year, according to Consul Wakefield, of Orillia: $624,191 on iron, $838,591 on steel, $273,440 on steel rods, $13,478 on binder twine, and $267,048 on crude oil.

The big plant of the American Sheet & Tin Plate Co., at South Sharon, Pa., resumed Aug 6. The mill had been idle for nearly two months due to a scarcity of sheet bar. By the resumption of the plant 1,500 skilled workmen are benefited.

Charles Neidhart Jr. has purchased the interests of Louis Steinfirst in the Keystone Iron & Metal Co., McKees Rocks, Pa., and will continue the business under the firm name.

CHICAGO.

Strong Conditions and Danger of Runaway Market Being Considered.

Office of THE IRON TRADE REVIEW, 1 62 Monadnock Block, Aug. 14

Whether or not there is to be a runaway market in pig iron is the topic of greatest interest here. It is certainly cheering from a conservative viewpoint to observe the generality of sentiment among the pig iron sellers against that development. "We are trying to hold back in the traces without having the appearance of so doing," is the way the representative of one large selling interest puts it. But it is recognized that the attitude of the buyers will perhaps be the controlling influence upon the situation. For the moment they seem to be more deeply interested in the market than for a long time. It is this week difficult to gain audience with a pig iron seller on account of the large number of visits with which he is favored by his customers. They are certainly looking for iron earnestly. It is no easy quest, if the guess of one seller is accurate. He says that three inquirers for spot iron are turned down to one who succeeds in getting the metal, which being interpreted probably means that the average applicant must shop around four places before succeeding. Most of the southern producing companies are out of the market. A few are offering moderate quantities, especially of the lower grades, which are relatively the more plentiful. Buying of pig iron for 1907 delivery has again been active this past week. The purchases were not so heavy as for the preceding week, but were sufficient to make it a good, active week. Nearly 50,000 tons were sold in lots ranging down from 5,000 tons, and, as during the previous week, most of it was northern product.

There has been good buying of iron bars, one mill disposing of 8,000 tons. The tendency is for bar iron to advance, but the heavy sales were made before quotations were marked up. There has been brisk buying of track supplies and in that branch of trade August will make a splendid exhibit in the west, having already to its credit over 20,000 tons. Steady buying of steel rails at a moderate pace has finally driven another important eastern steel rail maker from this market for the balance of the year and the tonnage that is reported sold for next year among eastern mills is becoming formidable. Old material has scored some notable advances this week

Pig Iron.—Inquiries for pig iron appeared in the Chicago market last week from the Cincinnati district. It was taken to mean that iron is scarce elsewhere as well as locally. The present demand for pig iron is unusually active at its two extremities, spot metal and deliveries in 1907. There is moderate trading for the coming months this year, but interest in those deliveries does not compare either with what precedes or follows that period. Most foundrymen have contracts for the balance of the year and most furnaces have their output sold that far ahead. But there is sometimes trouble in getting shipments on those contracts and for immediate delivery pig iron now commands a premium of 50 or 75 cents over what it can be bought for to be shipped the first half of 1907. The natural shortage, due to increased consumption and slightly restricted output, is intensified by the inability of some melters to get deliveries on their contracts and the necessity of seeking substitute iron. The recent extensive buying of metal for next year's needs is the outgrowth of this scarcity and the recently advancing market. Occasionally the opinion is still voiced among the melters that the present spurt will not continue long, but since the strength has appeared the buying farther ahead has become general. Prices are higher than a week ago. For the first half of 1907 local iron is quoted at $18.50 to $19 for No. 2 foundry. For spot shipment, it has been selling at $19.25 or better. Southern Ohio irons can not be imported under $17.50, furnace, or $19.80, Chicago, according to some quotations heard. Among southern products there is the same relative strengthening of spot iron. Sales are common this week of carload lots at $15 or more for No. 2 Birmingham, and irons that were sold late last week for deliveries during the next two or three months at, on the basis of $14.50, Birmingham, are now quoted 50 cents higher, or $18.90, Chicago. The southern makers are not commonly in the market for 1907 delivery, but a few quotations have been made at $14.50. Prices are as follows:

Lake Superior charcoal	$19.50 to 19.75
Northern Foundry No. 1	19.00 to 19.75
Northern Foundry No. 2	18.50 to 19.25
Northern Foundry No. 3	18.00 to 18.75
Northern Scotch Foundry	18.75 to 19.50
Ohio Strong Softeners No. 1	18.80 to 19.30
Ohio Strong Softeners No. 2	18.30 to 18.80
Southern Foundry No. 1	18.90 to 19.40
Southern Foundry No. 2	18.40 to 18.90
Southern Foundry No. 3	17.90 to 18.40
Southern Foundry No. 4	17.40 to 17.90
Southern No. 1 Soft	18.90 to 19.40
Southern No. 2 Soft	18.40 to 18.90
Southern Gray Forge	16.65 to 17.15
Southern Mottled	16.40 to 16.90
Southern Silveries (4 percent to 6 percent Silicon)	18.40 to 18.90
Jackson Co. Silveries, 8 to 10 percent Silicon	23.80
Alabama and Georgia Car Wheel	24.40 to 24.90
Malleable Bessemer	18.50 to 18.80
Standard Bessemer	19.30
Basic Iron	19.40

Steel Billets.—Some inquiry for forging billets exists for shipment next

year in this market. Consumers seem disposed to buy farther ahead by the evident scarcity for nearer by deliveries. In prices the market is firm. Forging billets sell at $35 Chicago; wire rods, $36 Chicago, and sheet bars, $29 Pittsburg.

Iron and Steel Bars.—The advance in the price of iron bars last week has affected that market quite materially. It is said that a heavy tonnage was closed by the Republic Iron & Steel Co., prior to the $2 rise, though the tonnage closed during the past week or since the advance has been comparatively light. Other mills are pursuing various policies. One western mill sold about 8,000 tons in two days and others have done fairly well in booking new business. All mills have not yet followed the large producer, but some of them are quoting the new basis, or 1.76½c, Chicago. Most of the larger western consumers are understood to be covered for the remainder of the calendar year. Mill prices, Chicago delivery, are as follows:

Bar iron, 1.66½c to 1.76½c; soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 2.06½c base, full extras; old rail stock, 1.65½c. Jobbers report a good demand from stock, with prices firm. We quote bar iron, 2.20c, full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; flats, 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $1.85 to $1.95 half extras; soft steel hoops, $2.30 to $2.40 full extras. Other sizes not mentioned above, $1.85 per 100 pounds base, plus half extras.

Sheets.—The supply of sheets is apparently short, for there are continued reports of inability on the part of mills to make prompt deliveries on old orders. Most of the large business is being transacted on long-time contracts, but there is also a good summer demand for spot or early shipments. Mill quotations, Chicago delivery, are as follows:

Nos. 8, 9 and 10, 1.96½c; Nos. 11 and 12, 2.01½c; Nos. 13 and 14, 2.06½c; Nos. 15 and 16, 2.16½c; box annealed, Nos. 18 and 20, 2.36½c; Nos. 22 and 24, 2.46½c; No. 26, 2.51½c; No. 27, 2.56½c; No. 28, 2.66½c; No. 29, 2.81½c; No. 30, 2.91½c. Jobbers' prices on less than carload lots from store are as follows: No. 10, 2.20c; No. 12, 2.25c; No. 14, 2.30c; No. 16, 2.40c; Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.70c; No. 26, 2.75c; No. 27, 2.80c; No. 28, 2.85c; No. 30, 3.30c.

Galvanized sheets, mill shipments, are as follows: Nos. 10 and 11, 2.56½c to 2.61½c; Nos. 17 and 21, 2.91½c to 2.96½c; Nos. 22 and 24, 3.06½c to 3.11½c; Nos. 25 and 26, 3.26½c to 3.31½c; No. 27, 3.46½c to 3.51½c; No. 28, 3.71½c to 3.76½c; No. 29, 3.91½c to 3.96½c; No. 30, 4.16½c to 4.21½c. From store, prices on less than carload lots are as follows: Nos. 10 to 20, 3.10c to 3.20c; Nos. 22 and 24, 3.25c to 3.35c; No. 26, 3.45c to 3.55c; No. 27, 3.65c to 3.75c; No. 28, 3.85c to 3.95c; No. 30, 5.05c to 5.15c.

Plates.—No large contracts are reported this week, but the specifications on old contracts are heavy and the mills are better loaded up than they have been at any time in several months. Prices are strong, mill shipments, Chicago delivery, being quoted as follows:

Tank steel, ¼-inch and heavier, up to 100 inches wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base; all full extras. Plates 3-16 inch thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. We quote from local stocks: tank steel, ¼ inch and heavier, up to 72 inches wide, 2c to 2.10c; 72 inches up to 96 inches wide, 2.10c to 2.20c; 3-16 inch up to and including 60 inches wide, 2.10c to 2.20c; 3-16 inch 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.15c to 2.25c; flange steel, 25c extra; heads, 25c extra.

Wire Products.—From a mill standpoint August business is again promising to break all records for the month just as June and July have done this year. The mills are rather increasing their output than declining, as warm weather usually does. Orders are insistent and pressure is exerted upon the mills to increase output. Quotations to jobbers, mill shipment, for Chicago delivery, are as follows:

Wire nails, $2; painted barbed wire, $2.15; galvanized barbed wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.15; galvanized staples, $2.40. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher.

Structural Steel.—The contract was let last week for the Kessner building, to be erected on Michigan avenue. It will require about 900 tons of steel. Bridge work of a miscellaneous kind has been very active, the tonnage being large, though individual contracts have usually been small. Specifications on contracts are reported to be increasing. Prices are without change, mill shipments, Chicago delivery, being as follows.

Beams and channels, 3 to 15 inches, inclusive, 1.86½c; angles, 3 to 6 inches, 1.86½c; angles, larger than 6 inches, on one or both legs, 1.96½c; beams, larger than 15 inches, 1.96½c; zees, 3 inches and over, 1.86½c; tees, 3 inches and over, 1.91½c, with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work.

Quotations on lots from store are as follows: All angles three inches and larger, including six inches, $2.25 per 100 pounds base; angles over six inches, $2.35 per 100 pounds base; tees, three inches and larger, $2.30 per 100 pounds base; beams, three inches to fifteen inches, inclusive, 2.25c per 100 pounds base; beams, eighteen inches and larger, $2.35 per 100 pounds base; channels, three inches and larger, $2.25 per 100 pounds base.

Rails and Track Supplies.—During the first two weeks of August western mills have sold for next year's shipment more than a three months' output of track supplies, or over 200,000 kegs of spikes, with corresponding tonnages of angle bars and bolts. Most of the large western railroad systems have closed contracts during the past few days and some of them have gone to the length of already placing with mills complete specifications for the delivery of these supplies, naming not only tonnages and dates, but places of delivery. The market for track supplies has strengthened somewhat on account of this heavy business and on account of the scarcity of spikes, particularly for this year's shipments. Pittsburg steel rail mills, which have been in this market for December deliveries, now announce they are sold up for the year. The M., K. & T. road is inquiring for 150 miles of track or about 18,000 tons of rails, and there are other inquiries in sight for next year. The situation for rails and track supplies could scarcely look brighter. Quotations are as follows:

Standard sections, f. o. b. mill, openhearth rails, $29; Bessemer, $28; light rails, Bessemer steel, 30 to 45-pound sections, $28.50; 25-pound, $29.50; 20-pound, $30.50; 16-pound, $31.50; 12-pound, $32.50, and lighter sections down to eight pounds, $29.50 to $41.50, all f. o. b. mill. Track supplies are quoted as follows. Angle bars, 1.50c to 1.75c; spikes (for quick shipment), 2.15c to 2.25c; for forward deliveries, 2c; track bolts (for quick shipment),

2.65c to 2.75c base; square nuts (for forward deliveries), 2.50c.

Merchant Steel.—Specifications for all kinds of merchant steel are heavy and August trade has started out to make a record. The tone of the market is strong at the following quotations, for mill shipment, Chicago delivery:

Planished or smooth finished tire steel, 1.86½c; iron finish, up to 1½ x ½ inch, 1.81½c; iron finish, 1½ x 1½ inch and larger, 1.66½c, base; channels for solid rubber tires, ¾ to 1 inch, 2.16½c, and 1⅛ inch and larger, 2.06½c; smooth finished machinery steel, 1.91½c; flat sleigh shoe, 1.71½c; concave and convex sleigh shoe, 1.96½c; cutter shoe, 2.35c; toe calk steel, 2.21⅛c; railway spring, 1.86½c; crucible tool steel, 6½c to 8c, and still higher prices are asked on special grades. Shafting, 50 per cent off in car lots and 45 per cent in less than car lots, in base territory.

Boiler Tubes.—There is a continued heavy absorption of tubes by the west and jobbers are enjoying a splendid summer trade. Prices are unchanged, as follows:

	Steel	Iron	Seamless
1 to 1¼ inches	46.35	43.35	53.35
1¾ to 2¼ inches	58.35	43.35	40.35
2½ inches	60.35	48.35	43.35
2½ to 3 inches	68.35	55.35	
2¾ to 4½ inches (Seamless)			50.85
6 to 13 inches	58.35	43.35	

Less than carload lots, from store, as follows:

	Steel	Iron	Seamless Steel
1 to 1¼ inches inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	36
2¾ to 3 inches, inclusive	60	47½	42½

Merchant Pipe.—The southwest has been a particularly good buyer of merchant pipe this week, though the demand is reported excellent from all portions of the west.

We quote on the base sizes, ¾ to 6-inch black steel pipe, 79.35 per cent discount, and 69.35 Chicago for galvanized pipe. Quotations on material from stock remain at 76 to 77 per cent discount on the base sizes ¾ to 6-inch black steel pipe.

Cast Iron Pipe.—The Kansas City municipal annual contract was closed last week. It amounts to about 5,000 tons and was secured by the United States Cast Iron Pipe & Foundry Co. There has been a fair trade of a minor character and the market is firm at previous quotations. We quote four-inch water pipe, $33; six, eight, ten and 12-inch pipe, $32; larger, $31; gas pipe, $1 extra.

Coke.—Trade in coke is brisk and the market is strong. Connellsville foundry is $3, ovens, or $5.65, Chicago, and Solvay coke is now held at $5.75.

Old Material.—Further appreciations in the prices of old material are noted this week. The strength is imputed largely to the decidedly better sentiment among dealers. There is among them a stronger tendency to hold scrap rather than pass it on to the consumer and for the purposes of investment they are inclined to bid better prices. There has been some buying by the consumers, but the tonnage is said to have been less than that purchased by dealers. The following quotations as revised are only approximately correct, for there is more than the ordinary divergence of views concerning the market on account of the unsettled conditions. Quotations in the first paragraph are for gross tons:

Old Steel Rails (4 feet and over)	$16.00 to 16 50
Old Steel Rails (less than 4 feet)	15.00 to 15 50
Old Car Wheels	18.25 to 18.75
Old Iron Rails	21.50 to 22.00
Relaying Rails, subject to inspection	27.00 to 27.50
Heavy Melting Steel	14.00 to 14.50
Mixed Country Steel	12.00 to 12.50

We quote net tons, as follows:

No. 1 R. R. Wrought	$14.75 to 15.50
No. 2 R. R. Wrought	13.75 to 14.50
Shafting	16.50 to 17.00
Dealers' Forge No. 1	12.50 to 13.00
Wrought Pipe and Flues	10.25 to 10.75
No. 1 Cast, 150 pounds and less	14.00 to 14.50
No. 1 Mill	9.00 to 9.50
Mixed Busheling (No. 1 & No. 2)	9.00 to 10.00
Country Sheet	8.00 to 8.50
No. 1 Boilers Cut	9.50 to 10.00
Boiler Punchings	11.50 to 12.00
Iron Car Axles	23.00 to 23.50
Steel Car Axles	18.50 to 19.00
Iron Axle Turnings	10.00 to 10.50
Cast Borings	8.00 to 8.50
Mixed Borings, etc	7.50 to 8.00
Machine Shop Turnings	9.50 to 10.00
Railroad Malleable	13.50 to 14.00
Agricultural Malleable	13.50 to 14.00
Stove Plate and Light Cast Scrap	12.00 to 12.50
Old Iron Splice Bars	17.00 to 18.00

CINCINNATI.

Southern Pig Advances and Many Inquiries Are Pending.

August 14, 1906.

Pig Iron.—The market continues firm and there has been a further advance in prices. For southern iron $14.50 Birmingham is now minimum and sales have been made at $15.00 for the higher grades. In northern irons there is but little tonnage remaining to be sold for delivery this year and for next year's delivery $17.50 has been quoted f. o. b. southern Ohio furnace. There is considerable inquiry pending and several large consumers are testing the market for the first quarter and first half of next year. When any large tonnage comes out for this year's delivery, but few of the agencies are able to quote on the entire tonnage on account of the sold-up condition of the furnaces they represent. Among the inquiries is one for three or four thousand tons for a large plumbing supply concern for this year's delivery. Two large Ohio manufacturers are in the market for 1,000 tons each for delivery in the first quarter of next year. Another melter in northern Ohio wants 600 tons of No. 2 foundry for next year's delivery. There are a number of smaller tonnages submitted. There is considerable interest manifested in prices for next year and producers and consumers are both unsettled as to what price would be acceptable.

The southern iron market appears to be steadily tending to a $15.00 basis, as a number of southern producers are declining to quote or are so well sold ahead that they can only quote on distant deliveries, which leaves the price situation in the hands of the large interests who still have iron to sell and these interests are now asking $15.00 Birmingham. From the number of inquiries in the market, it would appear that some of the smaller consumers have neglected their opportunities to cover for the balance of this year and it is the belief of the trade generally that quotations for this year's delivery will continue to advance as the available tonnage is steadily disappearing. The southern Ohio furnaces have not established as yet any general quotation for next year, but so far as we can learn $17.50 at furnace will be the starting point. One of the Virginia companies has advanced its quotations to $17.00 at furnace and another is on a basis of $16.50. Jackson county eight per cent silicon has advanced to $21.00 at furnace. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$18.00 to 18.50
Southern Foundry No. 2	17.50 to 18.00
Southern Foundry No. 3	17.00 to 17.50
Southern Foundry No. 4	16.50 to 17.00
Southern Foundry No. 1, soft	18.00 to 18.50
Southern Foundry No. 2, soft	17.50 to 18.00
Gray Forge	15.75 to 16.25
Northern Foundry No. 1	19.15
Northern Foundry No. 2	18.65
Northern Foundry No. 3	18.15
Jackson County Silvery, 8 per cent	22.15
Southern Charcoal	24.00 to 25.00

Finished Material.—The market continues firm and one of the large iron bar interests had advanced its price $2.00 per ton. The jobbing demand continues quite satisfactory.

We quote: bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.68c. We quote black sheets, No. 27 at 2.53c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.90c; No. 27, 2.70c; No. 16, 2.25c; No. 14, 2.15c; No. 12, 2.10c. Tank plates are firm and sell out of store at 2c to 2.10c for ¼-inch and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.35c from stock and angles at 2.10c to 2.15c for base sizes.

In merchant pipe prices are well maintained under fairly active demand. We quote f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts)

	Steel Pipe		Guaranteed Wrought Iron Pipe	
	Black Per cent	Galv. Per cent	Black Per cent	Galv. Per cent
¼ and ⅜ inches.....	69.7	53.7	....	....
⅜ inch.....	73.5	61 3	....	....
½ inch.....	73 7	61 7	....	....
¾ to 6 inches.....	77.7	67 7	....	....
7 to 12 inches.....	72.7	57.7	....	....

Coke.—The market shows continued firmness and some grades of foundry coke are higher. The irregularity of the labor supply is interfering with production and there is some complaint of car shortage. The prices in the leading coke producing districts are as follows:

Wise County, Va. Furnace Coke prompt shipment.....	$2.50 per ton
Wise County, Va. Foundry Coke on contracts.....	$3.00 to 3.25 per ton
Pocahontas Furnace Coke prompt shipment.....	$1.85 to 2.25 per ton
Pocahontas Foundry Coke on contracts.....	2.75 to 2.85 per ton
Connellsville Furnace Coke prompt shipment.....	2.50 to 2.85 per ton
Connellsville Foundry Coke on contracts.....	3.25 to 3.50 per ton
New River Foundry Coke on contracts.....	2.80 to 3.00 per ton
New River Furnace Coke, prompt shipment.....	2.25 to 2.50 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 to $1.70 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

Old Material.—The strength in the pig iron market is having a strengthening tendency on the market for scrap and some quotations are higher. We quote f. o. b. Cincinnati:

Old No.1 railroad wrought, net tons	$15.50 to 16 00
Cast machine and foundry, net tons.	13.50 to 14.00
Old iron rails, gross tons.....	21.00 to 21 50
Old steel rails, gross tons.....	16.00 to 16.50
Old short lengths, gross tons.....	16.50 to 17.00
Old iron axles, net tons.....	22.00 to 23.00
Heavy melting scrap, gross ton....	17.50 to 18.00
Stove plate, net tons.....	10.00 to 10.50
Wrought turnings, net tons	9.50 to 10.00
Cast borings, net tons.....	7.50 to 8.00
Car wheels, net tons.	16.00 to 16.50

The Robert Field's sales agency has been appointed sole agent for the Bird Iron Co., of Ironton, Ohio, and will in the future sell the product of this plant.

PHILADELPHIA.

Still More Buying of Basic.—High Prices for Spot Iron.

August 14.

Pig Iron.—The market has now reached a point where it may really be called excited, and sales have been heavy at advancing prices. Notwithstanding the enormous sales of basic reported in the last fortnight, and which were supposed to have pretty well covered all important requirements for some time to come, additional heavy orders were placed last week. The American Bridge Co. bought some 30,000 tons for its Pencoyd plants at prices ranging around $18, and Worth Brothers Co. at Coatesville were also heavy purchasers, having taken, it is said, from 10,000 to 15,000 tons. Other sales brought the amount of basic disposed of in the last few days to over 60,000 tons. Sales of foundry iron have also been heavy, and dilatory consumers have had to pay roundly for their mistake in forecasting market conditions. Purchases of No. 2X have generally been made in the vicinity of $19.25, but one sale (to take simply a sample of foundrymen's urgent needs) is reported where $18.50 was paid at the furnace. The freight rate brought the cost to the consumer up to $19.95, but he had to have the iron. This should not be taken as indicating that furnace men are taking undue advantage of the necessities of backward buyers, but the pressure for iron has lately been so great and the supplies so small, that buyers have been ready to bid pretty nearly any price. There is no indication of prices growing easier for the near future. Many of the sales made recently are for the first quarter of 1907, and few furnaces could fill any considerable order, in addition to those already booked, during the remainder of 1906. Pipe founders have made some good purchases of standard gray forge and all grades have been in demand.

No. 1X Foundry.....	$19.50 to 19.75
No. 2X Foundry.....	19.00 to 19 25
No. 2 Plain.....	18.50 to 18.75
Standard Gray Forge.....	16.75 to 17.00
Basic	18.00 to 18.25
Low Phosphorus.....	24.75 to 25.00

Finished Material.—Amid the general activity that marks the mills, plates may be said to be especially strong. Bar iron improves in demand, but the advance in prices made by western mills has not been followed by makers in this territory, largely because of strikes which have interfered with production and somewhat disturbed trade conditions. For structural material there is an ever increasing demand and premiums may be asked before long. In the meantime prices continue unchanged as follows: Beams, channels and angles according to specifications, 1.83½c to 2c; refined iron bars, 1.63½c to 1.73½c; steel bars, 1.73½c; plates, 1.73½c to 1.83½c.

Old Material.—Purchases by dealers covering short contracts continue an important feature of the market, but there are not lacking indications of an improving demand from the mills.

Old steel rails.....	$17.00 to 17.50
No. 1 steel scrap.....	16.75 to 17 25
Old steel axles.....	18.50 to 19.00
Old iron axles.....	25.50 to 26.00
Old iron rails	20.50 to 21.50
Old car wheels.....	17.00 to 17.50
Choice scrap, R. R. No. 1 wrought....	19.00 to 19.50
No. 1 yard scrap.....	17.00 to 17.50
Machinery scrap.....	16.25 to 16.75
Low phosphorus scrap.....	21.00 to 21.50
Wrought iron pipe.....	13.50 to 14.00
No. 1 forge fire scrap.....	13.00 to 13.50
No 2 forge fire scrap, ordinary	10.50 to 11.00
Wrought turnings.....	12.00 to 12.50
Axle turnings, heavy.....	13.00 to 13.25
Cast borings.....	9.75 to 10 25
Stove plates	12.00 to 12.25

NEW YORK.

Pig Iron Market Strong, Bordering on the Feverish.—Spot Iron Becoming Scarce.

Office of THE IRON TRADE REVIEW. }
ROOM 1315, No. 150 NASSAU ST., Aug. 13 }

Pig Iron.—The market has been extremely active during the week and although prices have been very irregular owing to individual advances of $1 or more per ton, buying has been in large volume. The total sales in the eastern market will probably exceed 100,000 tons, one-half of which represents basic. Most of these purchases involve metal to be delivered during the current year, but several transactions in foundry extend into 1907, and 15,000 or 20,000 tons of the basic is also to be forwarded in the first quarter. Spot iron of all grades is becoming scarce and premiums of $1 and upward have been offered for early shipment.

Consumers of all classes have been and are still in the market. Besides the routine foundry sales and inquiries, there were a number of transactions in round lots with large interests. The Baldwin Locomotive Works contracted for 6,000 tons of high and 7,000 tons of low silicon iron; 3,000 tons of malleable Bessemer for delivery during the last quarter went to a firm in Connecticut; and 30,000 tons of basic has been purchased for the Pencoyd Steel Works. Inquiries are pouring in from all quarters, agents receiving requests from unfamiliar sources showing great anxiety to contract for uncovered periods. Malleable Bessemer and low phosphorus are practically unobtainable and talk of importations is again rife.

Prices are extremely irregular. Some producers are demanding advances of 50 cents and others as high as $1.50 per ton, and these demands are not merely announcements of indifference in the matter of sales, for purchases have been made at widely varying figures. Alabama has been sold at $15, Birmingham, and $14.50 is asked for first quarter iron.

Ferro-manganese has not been particularly active. Prices remain the same and some of the producers are indifferent concerning immediate sales.

The following are prices of pig iron at tidewater:

Northern No. 1 Foundry.....	$19.25 to 19.75
No. 2 Foundry.....	18.75 to 19.25
No. 2 Plain.....	18.25 to 18.75
No. 1 Southern Foundry.....	19.00 to 19.50
No. 2 Southern Foundry.....	18.50 to 19.00
No. 3 Southern Foundry.....	18.00 to 18.50
No. 4 Foundry..... ..	17.50 to 18.00

Pig Iron Certificates and Warrants.—Trading on the New York Produce Exchange has been small, but a stronger tone prevails and prices are higher. The following are today's bid and asked quotations:

Standard Foundry Contracts.

	Bid.	Asked.
August	17.65	18.25
September	17.65	18.25
October	17.65	18.25
November	17.65	18.25
December	17.65	18.25

Finished Iron and Steel.—The midsummer lull has not yet run its course, although business has not been entirely inactive. Purchases of rails and shapes and especially plates and bars reach a very respectable figure and the tonnage pending has not diminished. Several new inquiries for rails have appeared, among others one from the M. K. & T. for 20,000 tons for 1907, and another for 5,000 tons from Cuba; and the engineers of the structural steel producers are preparing estimates on between forty and fifty jobs in addition to those which have been pending for several weeks.

Milliken Bros. Inc., have secured the contract for 3,000 tons of steel to be used in the erection of a warehouse in Brooklyn, and the American Bridge Co. booked during the week an order for 2,000 tons for a cement plant in Denver, Col., another for 5,500 tons of material for an extension of the elevated through Van Cortlandt Park, and a third for 350 tons of bridge work on the Atlantic Coast Line. There were in addition a number of small contracts for industrial construction and for use in the building trade.

Bar iron has taken a sharp upward turn. A week ago there were sales aggregating 6,000 or 7,000 tons at the rate of $1.50 base. Since then prices advanced and became somewhat irregular, at present ruling about 10 cents higher. There has been a good routine business in plates and much good business is on the horizon. There is considerable interest in the meeting of the Philadelphia common council which is to determine the destination of a contract involving about 8,000 tons of pipe plate. Bids have also been requested for plate to be used in the construction of three municipal ferry boats for the 39th street line on the East river. About 1,100 tons of plates will be required. The water department of Brooklyn will also need more plates for the construction of pipe lines in the near future.

The following are prices at tidewater: Angles, 3 to 6 inches x ¼ inch and heavier, 1.84½c; beams, 3 to 15 inches, 1.84½c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine boiler, 2.41½c; refined iron bars, 1.64½c to 1.74½c; soft steel bars, 1.64½c; sheets, No. 28 black, 2.50c.

Old Materials.—The market for all grades of scrap has hardened in a marked degree during the week in sympathy with the market for pig iron and raw material. Prices have hardened, but the actual movement of metal has not yet experienced much improvement.

Old iron rails	$20.00 to 21.00
Old steel rails, long lengths	15.00 to 15.50
Old steel rails, short pieces	14.50 to 15.00
Relaying rails	25.00 to 26.00
Old car wheels	16.50 to 17.00
Old iron car axles	25.00 to 26.00
Old steel car axles	18.00 to 19.00
Heavy melting steel scrap	14.50 to 15.00
No. 1 railroad wrought scrap	16.00 to 16.50
Iron track scrap	14.50 to 15.00
Wrought pipe	12.50 to 13.50
Cast borings	9.00 to 9.50
Wrought turnings	11.50 to 12.00

CLEVELAND.

Little Spot Iron Obtainable.—Efforts to Prevent Runaway Market.

Office of THE IRON TRADE REVIEW, BROWNING BUILDING, Aug. 14.

Iron Ore.—Producers deprecate the probability of the earliest buying movement in history and are striving to delay its opening until the latest possible date. Furnacemen are growing increasingly anxious to have their 1907 requirements covered, however, and it seems certain will force the miners to sell considerably before the tonnage of this season is all delivered. On the question of price there is good reason to believe that the advance over that of this season, if any, will not be heavy. Present prices are proving profitable and any large increase will tend to advance iron to unsafe heights. The movement of ore this month is continuing the terrific pace of June and July and will doubtless set a new August record. Some delay has been occasioned the past week by the collapse of a bridge at Duluth.

Pig Iron.—Little spot iron of any grade is procurable; where it can be had it is bringing almost any price the producer sees fit to ask. It develops that a goodly number of melters have not covered for their needs through the year and will have to pay dearly for their short sightedness. Selling for delivery through the first and occasionally the second quarter of next year has been heavy during the week, though a number of interests are refusing as yet to quote. For 1907 the Bessemer price has been pretty thoroughly established at $17.75 valley and in the neighborhood of 100,000 tons have been closed by the association and one outside interest at this figure. There is no Bessemer or basic remaining in this district for 1906 delivery. Spot foundry iron is selling readily at $18.00 valley, with the supply limited. For next season from $17.50 to $18.00 is being secured. Malleable for prompt shipment is almost as scarce as Bessemer. Sales have been made recently at $18.00 valley, but $17.75 can probably still be done. Southern furnace interests are sold through the season, with one exception, which has been securing $15.00 for its iron during the last day or two.

Bessemer	$18.65 to 18.85
No. 1 Foundry	18.50 to 18.75
No. 2 Foundry	18.25 to 18.50
No. 3 Foundry	17.50 to 18.00
No. 2 Southern	18.00 to 18.85
Gray Forge	17.00 to 17.50
Gray Forge, Southern	16.00 to 16.50
Lake Superior charcoal	19.50 to 20.00

Coke.—Along with the present uncertainty as to the price of ore for next season, the probable price of coke is also a source of anxiety with pig producers. Ovens are generally holding off and quotations are made only rarely. Labor difficulties have interfered somewhat with production in the Connellsville region of late and prices have been slightly advanced, now being about $3.25 for foundry coke and $2.85 for furnace.

Finished Materials.—A generally improved tone is noted with specifications heavy and new orders more plentiful. Both shapes and plates have strengthened materially, largely through recent heavy ship building orders. More premium business is being done and consumers of late have been placing many supplementary orders to meet requirements which have proved heavier than had been anticipated. The Lackawanna Steel Co. will supply the steel for three of the ore freighters recently ordered. Sheets are increasingly scarce and deliveries are being delayed to such an extent that an advance is being talked of. Iron bars are strong at the recently advanced quotation, which for Cleveland delivery is 1.70c, and deliveries are not keeping up with the heavy demand.

Old Materials.—In line with the improved tone in pig iron, scrap has grown very much stronger during the past week and what gives promise of proving an extensive upward movement has set in. Mills are buying freely, though many dealers are holding for still higher prices before letting go their accumulations of the last few months. A heavy tonnage has been closed and the market is active. We have revised our quotations which are as follows, Cleveland delivery, gross tons being given in the first paragraph:

Old iron rails	$23.50 to 24.50
Old steel rails (over 6 feet)	17.50 to 18.50
Old steel rails (under 6 feet)	17.00 to 17.50
Old car wheels	17.00 to 17.50
Steel boiler plate	14.50 to 15.00
Steel axles	19.00 to 20.00
Malleable iron (railroad)	16.50 to 17.00
Malleable iron (agricultural)	13.50 to 14.00
Heavy steel	16.00 to 16.50
Country mixed steel	14.00 to 14.50

We quote net tons as follows:

No. 1 R. R. wrought	16.00 to 16.50
No. 1 busheling	13.50 to 14.00
No. 1 machine cast	14.00 to 14.50
Iron axles	23.00 to 24.00
Axle turnings	10.50 to 11.00
Wrought turnings (free from cast)	10.00 to 10.50
Grate bars	10.00 to 10.50
Pipes and flues	12.50 to 13.00
Tank iron	12.00 to 12.50
Hoop and band iron	8.50 to 9.00
Sheet iron	7.50 to 8.00
Wrought drillings	10.00 to 10.50
Stove plate	10.50 to 11.00
Cast borings	7.50 to 8.00

ST. LOUIS.

Heavy Buying of Iron at Advance.—Building Boom Grows.

August 13.

Pig Iron.—Despite another advance in iron quotations there was more activity than last week. There is absolutely no spot iron to be had today under $14.50 and $15.00 Birmingham, is being paid in many instances. There is not so much attention paid to grade these days as to delivery. Southern furnaces are cleaning up their yards of odd grades and soon they will be swept bare. Consumers who bought at the low ebb are even taking off silicon and high sulphur iron, in place of No. 2, so eager are they for deliveries. One melter who was caught short bought 500 tons of high sulphur iron in the last week, paying $14.00.

Before the last upward movement, which set in Saturday, a melter in St. Louis territory bought 500 tons of No. 2 for $13.55 for November and December delivery, but it was a poor grade with the differential of 45 cents off. This same iron today could not be bought under $14.50,

There is strong faith in the future. Inquiries, while not numerous, are beginning to pick up and a brisk business seems to be in store for the fall and early winter. A St. Louis house has closed a contract with a large melter for 800 to 900 tons a month from January to June on a basis of $14 for No. 2. The American Steel & Foundry Co. has just bought a large tonnage of Virginia basic.

Southern No. 1	$18.50 to 19.00
Southern No. 2	18.00 to 18.50
Southern No. 3	17.50 to 18.00
Southern No. 4	17.00 to 17.50
Gray Forge	16.75 to 17.25

Coke.—There has been no abatement in the activity in the coke market. The price remains from $5.80 to $6.30, but a larger volume of business is moving. Afraid of being caught when the winter rush comes, orders are being sent in earlier than usual.

Finished Material.—Three months ago there were those who predicted that the building boom in St. Louis would collapse before fall. Instead of seeing their prophecy fulfilled, they have seen the boom get its "second wind" and it is stronger than ever. All the local mills have more work on their hands than they can attend to and they are selecting only the most choice contracts, turning the others away. Besides the large office buildings in course of construction, the tonnage for which will aggregate 50,000 tons, there are numberless small contracts requiring fully 20,000 tons. Three new office buildings and an addition to the Anheuser-Busch brewery are still in the market. The contract for the construction of the Butler Bros. building has been let to the James Black Construction Co.

BIRMINGHAM.

Pig Iron Strong, Prices Higher and Much Interest in the Future.

August 13.

Alabama pig iron is still in strong demand and is bringing the best price that has prevailed in many a month. No. 2 foundry iron is now quoted at $14.50 per ton, with immediate delivery, small lot orders being accepted at $15.00 per ton. Some of the manufacturers in this district have already begun studying their conditions as to being in a position to accept much more business for anything like three or four months. The probable make for the balance of the year will shortly be under the ban on account of the steady business that has been coming in. The steady advance made in quotations did not appear to curb the demand. The statement was made in some of the iron companies' offices the last of the past week that there were indications of a runaway market. It was stated openly that $15.00 per ton, No. 2 foundry, was being quoted, but whether any sales were made at that price outside of special analysis iron or special brand iron cannot be stated. The production in this state is somewhat off the normal condition and all but one of the smaller producers are unable to take much prospective business, their furnaces being out of commission. There are some furnaces ready for blast, but, for reasons best known to the companies, time is being taken before they are blown in. Considerable work is being done in the way of furnace repairing. Brokers are making effort to buy iron in this district under the published quotations. This would indicate considerable strength in the mart. Furnace companies when approached for iron do not appear to be anxious to sell at all and when requested to make a price boldly ask for $14.50 and $15.00 per ton for their product. The demand will only be regulated by the price.

Some sales have been for delivery during the first three months of the coming year. A healthy inquiry is noticed already as to the probable make next year and what prices will likely be at that time. There is inquiry for large, round lots, showing that the consumers are not looking forward to any dull times for some time to come.

Metal Market

NEW YORK.

August 13.

Pig Tin.—The market has been subject to violent fluctuations during the week and today is firm and higher.

The following are today's quotations: Spot, 40.50 to 40.75; August, 40.30 to 40.60; Sept., 40.05 to 40.25; London, £182 5s and £182 10s. Arrivals for the month to date, 311 tons; afloat, 2,146.

Copper.—There has been comparatively small buying but the market remains steady. Today's quotations: Lake, 18⅝ to 18¾; electrolytic, 18⅜; casting, 18 to 18¼. London, £83 5s and £83 5s. Exports for the month to date, 3,815.

Lead.—Lead has been dull under rather free offerings. Today's closings, 5.75; St. Louis, 5.65; London, £17.

Spelter.—The demand for refined spelter is small and prices rule steady. Today's quotations: 6.00 to 6.10; St. Louis, 5.90; London, £26 17s 6d.

CHICAGO.

August 14.

Lake copper is now quoted at 18⅝ to 18¾; electrolytic, 18½c to 18¾c, and casting, 18c to 18¼c. Pig tin, car lots, 39c to 40c; pig lead, desilverized, 6c to 6.10c for 50 ton lots; corroding, 6.50c to 6.55c for 50 ton lots; sheet zinc, $7.75 list f. o. b. LaSalle in car lots of 60-lb. casks; spelter, prompt delivery, 6.10c to 6.15c; Cookson's antimony, 25c; other grades 23c to 24c; nickel, 47c for round lots, and 50c to 60c for smaller.

On old metals we quote, copper wire, 16¾c; heavy copper, 16½c; copper bottoms, 16¼c; copper clips, 16c; red brass, 16c; red brass borings, 14¼c; yellow brass, 12¾c; yellow brass borings, 10¾c; light brass, 9½c; lead pipe, 5¾c; zinc, 5c; pewter, No. 1, 24c.

ST. LOUIS.

August 13.

Lead ruled quiet during the week, but today found the price steady to stronger. Missouri brands are quoted at $5.65 to $5.67½. Spelter was lower to sell at $5.90, and was offered at $5.92½, at which there were no buyers today.

It is evident that the importation of Mexican ores is having no disastrous effect on the Joplin or Missouri-Kansas districts and the superior quality of the United States ore will continue to command a premium. The price for zinc ore was $48 for the best, on an assay basis of $42 to $45 per ton on 60 per cent zinc.

THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND

BOSTON DULUTH
CHICAGO NEW YORK
CINCINNATI PHILADELPHIA
PITTSBURGH

Subscription, $3.00 per annum. To Foreign Countries, $4.50. Advertising Rates Furnished on Application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co., will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, AS SECOND CLASS MATTER

PRINTED IN AN OPEN SHOP

August 16, 1906

A PLEASING PROSPECT.

In determining whether there is a solid basis for prosperity, it is always wise to go back to the farm and inquire what are the prospects for crops. This year such an inquiry develops a very pleasing condition of affairs. The Department of Agriculture reports that the condition of corn on Aug. 1 was 88.1, as compared with 87.5 last month and with a 10-year average of 84.0. Preliminary returns indicate a winter wheat crop of 493,434,000 bushels, or an average of 16.7 bushels per acre, as compared with 14.3 last year. The average condition of spring wheat on Aug. 1 was 86.9, as compared with 91.4 last month, and a 10-year average of 82.6. The reports as to oats and potatoes are fairly satisfactory.

Given good crop prospects, one can generally expect prosperity of the railroads, and if this be true during the second half of this year, the splendid record of the first half of the year will be surpassed. The statistics of the *Financial Chronicle* show that railroads having 182,611 miles of tracks (which is within 15 per cent of the total mileage of the country) show gross revenues larger by $117,543,761, or 14.27 per cent, for the first six months of 1906 than for the first six months of 1905. "Such an exhibit," says the *Chronicle*, "would be noteworthy standing by itself, but coming on top of the large antecedent gains, it furnishes new testimony to the wonderful expansion of the traffic and income of the railroad system of the country." This increase exceeds the corresponding addition for the same period in any preceding year. Taking into consideration railroads whose reports are not available, as well as those included in the mileage just referred to, the *Financial Chronicle* estimates that the increase for the first six months of this year is $130,000,000, and that comparing the first halves of the years 1897 and 1906, the increase is $615,000,000. The prospect is that traffic will continue equally heavy for at least 12 months. While a number of state boards have been active in compelling reduction in rates, and while there has been some anxiety as to the result of the new national rate bill, continued prosperity of the railroads may be expected.

With conditions so favorable for prosperity, with almost nothing to detract from this pleasing view, there is, however, reason for caution in the iron and steel business as well as in other lines of activity. Excessive prices always mean delay of new enterprises, which is followed by decreased demand, lower prices and a general change for the worse. Powerful influences for conservatism are at work beginning with iron ore and extending through to finished materials, and if they dominate, they will give us more prolonged prosperity than the country has ever before enjoyed.

TOOL STEEL AND PROSPERITY.

There is probably no more accurate index to the activity of the iron and steel working industry than that afforded by the condition of the tool steel market. Industrial changes not only make themselves immediately felt in this line, but their effect is so pronounced as to be thoroughly apparent. While the large machine shop is being operated to capacity, it creates a regular and heavy demand for tool-making steel. On the other hand, when business is light and the plant is operated to only a part of its capacity, the general tendency to retrench is manifested. The costly steel tools are transferred from the idle machines to the few in operation, with the result that for a time the demand for tool steel is practically wiped out. Naturally a recurrence of activity following a period of idleness means that practically all the machinery of the plant must be re-equipped, and frequently the demand for tool steel for this purpose will increase four-fold within a few months.

Just such a program as has been outlined is being carried out at present. During the period of depression and comparative inactivity in 1904, tool steel producers found their sales alarmingly small. Manufacturers were operating only part time and were using up all their available stocks of tools by switching them from one machine to another. The following year, when industrial conditions began to improve, the demand for tool steel increased at a rate out of all proportion with the general return of activity. Then after a time the immediate requirements of machine shops were filled; the stocks of tools had been replenished and the trade settled down to the constant stream of orders for replenishing. That condition has continued with little change and so far as present indications are concerned is destined to hold indefinitely. This means that there are no idle machines in iron and steel working shops and that capacity production is the rule. It is an indication thoroughly favorable and one in which the trade has come to place a great deal of reliance.

BUYING OF ORE FOR NEXT SEASON.

Along with numerous other new records in the iron and steel industry, the current year, from present indications, will claim distinction by reason of opening the ore buying season at an unprecedentedly early date. Ore producers are naturally opposed to any abnormally early buying movement, and are viewing with disfavor the anxiety already manifested by furnace interests over their ore supply for 1907. The output of the present year is but half delivered, the mining interests say, let the matter of next year's requirements rest until the perplexities of this season are over.

But ore consumers are not inclined

to wait. A few years ago they were content to hold off buying until the announcement was made in the first month or two of each year of the season price fixed by the ore association. Then buying would start in and would scarcely be completed by the opening of navigation. This condition of affairs was first broken up in the fall of 1905 when the certainty of prosperity well into the current year and the opportunity for contracting for the first half's pig iron output forced furnace interests to secure their raw materials early. About the middle of October prices began to be discussed informally and the prediction was then made by THE IRON TRADE REVIEW that an advance of 50 cents would establish the season price. Some ore sold at a 25-cent advance late in October, but this was speedily cleared out and by the last of November the movement at the 50-cent advance was in full sway. The middle of December saw the desirable grades all sold and by the end of the year even the chartering of tonnage, except by the Steel Corporation, was over.

That short, active buying movement was a record one. It had its disadvantages in that it forced producers to estimate the output of their mines at an unusually early date and that shippers were uncertain as to the stability of labor conditions on the lakes. But on the other hand it meant that the entire winter could be spent in preparing mines, railways and docks for the supreme test of the coming season, and the largest ore movement in history is resulting.

Something of the same conditions prevailing when the price was fixed and buying began for 1906 hold today, though present tendencies are apparently more pronounced. The industry is more active than in October last, prices are higher, and prospective business is fully as great. In some instances furnaces have already sold iron for 1907 delivery and heavy inquiries will be closed as soon as the raw material market can be accurately forecast. A new factor, in the remarkable shortage of Bessemer ores during the current season, is a source of anxiety to furnacemen, as is the fact that the movement this year will show a relatively small increase over that of 1905, indicating that capacity shipments with present facilities are being approximated. In view of the growing dependence on Lake Superior ores and the prospect of a continuance of maximum furnace output, this is especially significant.

With these conditions to contend with, it is altogether likely that furnace men will insist on closing for their ore requirements at least as early as last year and probably considerable earlier. Like that of last fall, the buying season will doubtless be short and active and will exhaust the desirable ores before the present navigation season closes.

Leading producers intimate that so far as the price is concerned, no large advance over this season's figures will be asked. The past dozen years have seen two seasons in which the price was abnormally high, and lower iron quotations with a restricted ore movement resulted in both instances. In spite of the dissolution of the ore association, the tendency since 1900 has been toward less fluctuation in ore prices. That of 1904 showed a heavy drop from the 1903 quotation, but other years have either held the same level or recorded modest increases. The danger of a "toppling over" of present activities through forcing iron prices to unreasonable heights is too well known to permit of as heavy an advance as the demand for ore would indicate as possible, even if there was a disposition to profit thereby. But producers have let it be understood that they will seek only a fair profit and this is one of the strongest indications of continued prosperity through the coming year.

A HIGHLY SUCCESSFUL MEETING IN LONDON.

The recent meeting at London of the Iron and Steel Institute and American Institute of Mining Engineers was a great success whether viewed from a technical standpoint, or socially, or as a promoter of international good feeling. THE IRON TRADE REVIEW published an elaborate report of the meeting, the discussions of which were of unusual importance. The greetings by President Hadfield, of the Iron and Steel Institute, and Sir James Kitson were indeed cordial, and exhibited a thorough understanding of conditions in iron and steel manufacturing in the United States, while the reply of President Hunt, of the American Institute of Mining Engineers, was not less gracious. President Hunt's address at the American session was also a noteworthy contribution. The selection of R. A. Hadfield and John Edward Stead for honorary membership in the A. I. M. E. was eminently wise, but the bestowal of the Bessemer medal on King Edward is not especially pleasing to citizens of a republic, although this country certainly has not an unassailable record for good taste in the conferring of honorary titles. From the time when a great institution of learning in New England conferred a learned degree upon President Jackson there have been countless cases where the appropriateness of such proceedings has been criticized. Edward VII is a wise king, but the title of Bessemer medallist will not add to his fame.

One of the most important discussions of the meeting was that following the reading of Albert Ladd Colby's paper on "A Comparison of American and Foreign Rail Specifications." The letter read by Dr. Raymond from E. F. Kenney, the engineer of tests in connection with the Pennsylvania Railroad Co., in which it was declared that phosphorus is an unmixed evil and that every American railroad having heavy traffic is suffering greatly from broken rails can hardly fail to cause manufacturers to endeavor to produce a product which would be more satisfactory to railroad officials. Owing to the higher phosphorus content of the Bessemer rail, the tendency seems to be strongly toward the open-hearth product.

Another important paper was that on "The Development of the Roe Puddling Process" by James P. Roe, of Pottstown, Pa. An extended abstract of this paper is given in this issue of THE IRON TRADE REVIEW. It has been frequently predicted, that the puddler will be unknown before many

years, but the efforts of Mr. Roe and others toward the perfection of mechanical puddling show that, although there may be no men puddlers, puddling will still continue.

Still another paper of considerable interest to iron and steel men was that presented by Mr. York, describing his new system of rolling iron and steel. While revolutionary in its character, President Hunt of the A. I. M. E. stated that it had received the approval of such a high authority as John Fritz. The paper was published in THE IRON TRADE REVIEW of June 21, and will bear careful reading, inasmuch as it may influence important changes in the present method of rolling steel sections.

Although there have been other meetings in the United States and in England of the Iron and Steel Institute and American engineers, there have been none in which good fellowship was more prominent. In an editorial discussing the meeting under the caption "The Brotherhood of Science," the New York *Sun* a few days ago said:

"The pleasing task of promoting international amity and the brotherhood of man is apparently not to be monopolized by peace conference delegates of after-dinner orators at Anglo-American dinners for European despatches and letters indicate that our keen-minded engineering men are very busily establishing an international cordiality that is more concrete and more practical than any scheme suggested at the recent inter-parliamentary conference."

The demands of business are often influential factors in promoting peace and the frequent international meetings of scientists will surely make stronger the friendly ties of the nations represented.

We publish this week a contribution by Mr. John C. Powers on "Iron Ore Sampling at Lake Erie Ports." The article is a rather severe criticism on present methods, and while we do not endorse all the author says, careful inquiry convinces us that there is much ground for his criticism. When engaged in the sampling of ore, Mr. Powers was considered very competent. He is now in other business in the south. We believe the large selling interests are very careful, but there may be opportunities for improvement on present systems. THE IRON TRADE REVIEW invites discussion on this subject.

News From the Labor Field.

Employees of the shops of the Cincinnati Metal Trades Association members were given a free outing at Chester Park Aug. 11. The invitation included the families of the employees, and tickets of admission and passes for all available amusements were supplied free of cost. It was the largest affair of the kind ever held in that vicinity, 37,000 people passing through the gates. There were 150 of the employers present who acted as an entertainment committee. A number of athletic contests were arranged for, and there were 285 contestants and 506 entries, which is the largest number ever taking part in a Field Day of any kind in that city. The athletic events were in charge of M. C. Longnecker, of the Cincinnati gymnasium, who had a corps of 15 assistants. A fire works display, specially arranged so as to be of particular interest to the craft, was presented. The affair was in every way a pronounced success, and it is believed will do much toward promoting good feeling between employer and employee. There was no disorder of any kind and not an accident. The Cincinnati Traction Co. furnished extra cars in order to accommodate the crowd. About 100 of the employers took dinner on the grounds, at a special table. The outing was such a satisfaction to all concerned that it will be repeated next year. John M. Manly, secretary of the association, had charge of the arrangements under the direction of a special committee, consisting of B. B. Quillen, of the Cincinnati Planer Co., L. C. Twachtman, of the Fosdick Machine Tool Co., P. H. Geier, of the Cincinnati Milling Machine Co., and E. H. Hargrave, of the Cincinnati Tool Co.

Milwaukee Injunction.

Another restraining order has been issued by Court Commissioner Hugh Ryan, of Milwaukee, at the instance of the Vilter Mfg. Co., enjoining molders' unions Nos. 331, 125 and 446, and thirty-five individual members of the unions on strike, from interfering with the business of the Vilter company. This is the company which obtained an order of a similar nature about two months ago, since which time it has been examining members of the molders' unions regarding the methods they pursue in conducting their strike, picketing plants and persuading non-union men from continuing at work. The examination, it is believed, will be made the basis of subsequent court proceedings. The complaint upon which the injunction was issued sets out practically the same allegations regarding threats and intimidation of non-union men by strikers which were contained in the complaints of the Bucyrus Steam Shovel & Dredge Co. and the Allis-Chalmers Co. against the same defendants.

The strike situation in Milwaukee remains practically unchanged so far as the strikers themselves are concerned. The employers are daily putting on additional men.

A fact interesting especially because of the continuance of the strike, is the announcement that the Milwaukee School of Trades, founded by Milwaukee manufacturers last year and opened early in January with an unexpectedly large attendance, is to incorporate a course in molding and foundry practice in the branches arranged for the reopening of the school next month. There is also to be a new course for machinists, not heretofore provided.

The Labor Situation.

The strike situation in the Buffalo district continues about the same as it has been for several weeks. Plenty of independent workmen are seeking employment, but not all have secured it. Most of those desiring work as molders were sent west, some as far as Kansas City, where help was needed. The number of strictly open shops at Buffalo still stands at 11.

The increase in membership of the N. M. T. A. since the last convention has been greater than at any equal period of time in the history of the organization. This is largely due to the efforts of J. H. Cone, assistant secretary. W. P. Eagan, the commissioner who has been in Chicago in consultation with his physicians, has left for New Mexico.

Boiler manufacturers of Chicago report a complete victory in the strike which has been in force in that city for the past two months. The men who went out are now seeking employment under any conditions.

The entire plant of the Carondelet Foundry Co., St. Louis, Mo., is idle, as the result of the refusal of its employes to handle work taken from the Whitman Agricultural Co., which recently established the open shop.

The coremakers of St. Louis recently made a demand on the foundrymen of that city for an increase in wages, effective Aug. 1. This was refused and nothing has since developed.

The molders' strike in the eight struck foundries of New Orleans, La., is declared at an end. Shops are running satisfactorily, and in some cases are turning out more work than before difficulties commenced.

Certain candidates for political office

at Toledo, O., have recently received letters from the Metal Trades Association, of that city, requesting a statement of their attitude toward special legislation in the interests of trusts or organizations of either capital or labor.

The puddlers of the West End Rolling Mills and Lebanon Valley Iron Co.'s mills at Lebanon, Pa., are out for a $4.50 rate, which has been refused.

The foundry and factory of the Klauber-Weldon Dyeing Machine Co., of Amsterdam, N. Y., have been shut down and will be removed to Philadelphia. The company has recently experienced considerable trouble with strikes among the molders and other employes, and it is largely for this reason that the plant is being removed.

James Nutt, secretary of the Western Bar Iron Association with headquarters in Youngstown, has returned from a western trip. He reports business brisk through Indiana and Illinois. The strike at the Vincennes plant of the National Rolling Mill Co. has been adjusted. The roll hands demanded pay for iron turned down by the mill inspectors.

The Canton Iron & Steel Co., Baltimore, Md., states that the report recently published to the effect that a strike is on at its plant, is an error. The Canton plant is a non-union mill. No trouble has been had and the men are working at the wages prevailing during the past three or four years.

Employes of the Wellston Iron & Steel Co., to the number of 325, have received an unsolicited advance in wages of 15 per cent.

Attorney-General Moody has held, in an opinion to the secretary of the navy, that battleships in the course of construction are not public works, and hence the eight-hour labor law does not apply to them. This confirms the previous opinion of Attorney-General Griggs.

The Union Steel Screw Co. and the National Safe & Lock Co. have applied for membership in the Cleveland branch of the National Metal Trades Association.

The strike of the machinists at Indianapolis has been settled and all of the shops of the new members of the N. M. T. A. are working with a full quota of men, and are running open shops. Several report an increase of output.

The Zero Valve & Brass Mfg. Co., Buffalo, N. Y., whose plant was struck May 1, just as the company began to move its factory, reports it now has the same number of non-union men in its foundry as before that time, and is getting better returns for its money from them. As soon as it was settled in its new factory the company started to take off heats and has been doing so every working day since.

BRITISH IRON AND STEEL PRODUCTION.

The annual statistical report of the secretary to the British Iron Trade Association has been distributed to the members. The principal features of the production of iron and steel in Great Britain, as compared with those of 1904, are presented (in tons) in the following table:

	1904.	1905.
Coal	232,411,784	236,111,150
Iron ore	13,774,282	14,591,168
Pig iron	8,562,658	9,592,737
Bessemer ingots	1,781,553	1,974,210
Bessemer rails	916,374	951,552
Bessemer acid ingots	1,129,224	1,396,233
Bessemer basic ingots	652,309	577,977
Open-hearth ingots	3,245,346	3,838,072
Open-hearth acid ing's.	2,583,282	3,042,834
Open-hearth basic ing's.	662,064	795,238
Puddled bars	936,228	938,558

Total imports of iron, steel and machinery were valued at £19,750,534, as against £17,845,826 the previous year; exports were valued at £70,046,419, as against £62,354,442. Iron ore imports in 1905 were 7,344,786 tons, with exports of 14,433 tons. Iron and steel exports were 3,870,746 tons, and imports were 1,379,127, both considerably increased over the preceding year. Tin plate exports showed a small decline, being 354,951 tons, against 359,634 tons in 1904.

How Chicago Lost.—William Duff Haynie, attorney for the Illinois Steel Co., recently told the board of review of that city why the new plant of the corporation was located at Gary and not Chicago. "Room for expansion was needed," he explained, "we are in so many controversies with the city that oftentimes we wish we were out of it altogether. If the company could have made peace with the state and city, and had been permitted to make land out of navigable water, Chicago would, no doubt, have had the largest steel plant in the world." The board added $3,230,000 to the personal property assessment of the Illinois company, bringing the total up to $6,748,000. It develops that purchase price of the Gary site was $1,926,065. Contracts for the construction there of 300 dwellings have been let.

An option has been taken on 40 acres of land along Crab Creek just north of Youngstown, O., for an iron forge and casting plant which when built will be a very large concern. John M. Evans, representing eastern capitalists who consider Youngstown a desirable and advantageous place for the location and operation of such an industry, secured the option. He was formerly a resident of that city, being employed at the Youngstown mill before that plant was taken over by the Carnegie Steel Co. For some time past he has been living in Boston.

COLORADO FUEL & IRON CO. ANNUAL REPORT.

The report of the Colorado Fuel & Iron Co. for the year ending June 30, issued late last week, shows that the net earnings during that period increased nearly a million dollars. The gross earnings for 1906 were increased by $3,750,028 over those of 1905, and $13,694,370 over those of 1904. The net earnings increased $1,084,835 over those of 1905 and $2,555,761 over those of 1904. The chief items of the report compared with the corresponding figures of 1905 and 1904 are as follows:

	1906.	1905.	1904.
Gross	$22,320,045	$18,615,017	$8,625,675
Oper & main exp	19,761,017	17,140,824	8,622,408
Net	$2,559,028	$1,474,193	$3,267
Other income	505,701	447,855	27,945
Total income	$3,064,729	$1,922,048	$31,212
Sinking fund, prov., etc..	2,392,917	2,264,041	1,616,068
Surplus ...	$671,812	*$341,993	*$1,584,856

*Deficit.

During the year the company expended $740,166 for enlargements and improvements and $238,844 for excess cost of Lake Superior ore. The earnings in the different departments for the last three fiscal years are as follows:

	1906.	1905.	1904.
Iron dept...	$12,454,643	$9,171,204	$5,005,911
Fuel dept...	9,502,106	9,073,657	3,455,496
Miscellaneous	363,296	370,158	164,268
Total	$32,320,045	$18,615,018	$8,625,675

In his remarks concerning the year's operations President Hearne says: "The company has now been put upon a basis where a surplus of earnings is shown above all requirements for operation, fixed charges, etc., and barring unfortunate contingencies may be expected to show substantial increases in both gross and net earnings with each succeeding year."

Malleable Foundry Needed.—The Business Men's League, of St. Joseph, Mo., has prepared a handsome folder setting forth the commercial advantages of that city. Horace G. Krake, commissioner, writes that there are excellent openings for additional manufacturers in iron articles, such as house appliances and farm and mining machinery. A malleable iron casting plant is also badly needed. Local capital can be interested in meritorious enterprises, it is stated, if established and operated by men of experience and reliability.

The Business Barometer.—"There are four great tests of a business situation," says the *Wall Street Journal:* "First, the crops; second, the railroads; third, the steel trade; fourth, the banks. Judged by all four of these tests, busines conditions are active and prosperous, and likely to continue so for an indefinite period."

OPEN-HEARTH FURNACE

And Other Improvements of Mackintosh, Hemphill & Co..

Mackintosh, Hemphill & Co., of Pittsburg, on account of its rapidly increasing business in the steel casting department, is now installing a 25-ton acid, open-hearth furnace designed by the Amsler Engineering Co., and put in under the direction of D. F. Nesbit, engineer in charge of construction. This addition also necessitates the installation of one and probably two Morgan 50-ton electric cranes serving over the new furnace and the steel department. New foundations are also being added and the steel work is being done by the Pittsburg Steel Construction Co.

The end of the old ingot mold foundry is being torn out, uniting it with the present steel foundry of the company and doubling the capacity of this department, giving a daily capacity of 70 tons of steel castings.

Over the foot of Twelfth street, which has been abandoned to the company by the city, a 25-ton Morgan electric crane and runway is being added, enabling the loading of machinery for both B. & O. and Pennsylvania railroad shipment, as well as increasing storage facilities.

This company has also installed an Ingersoll-Rand air compressor of the Rand Imperial type, direct connected with the motor by Morse chain, for use in the steel and iron foundry in the operation of pneumatic tools, chippers, rammers, etc. This compressor is provided with a Cutler-Hammer starting and stopping device, which maintains a constant and steady pressure, but shuts down the motor when the air is not being used.

In addition to these improvements a spur track has been run into the machine shop from the Allegheny Valley railroad, the front being torn out of the machine shop building, so that heavy castings may be loaded with the regular machine shop cranes. These improvements are made necessary largely on account of the company's steel casting and steel roll business.

RAMSEY PLANS RAILROAD.

Joseph Ramsey, Jr., former president of the Wabash railroad, has announced the plans of a foreign banking syndicate to build a railroad, to be known as the New York, Pittsburg & Chicago Air Line, between Chicago and New York, at a cost of $150,000,000. He says that not only have all surveys been made, but they have been thoroughly revised and that the road will be completed within three years. Details have not been announced, but Mr. Ramsey says electric locomotives will be used and that the line, which is 180 miles shorter than the shortest existing railroad between Chicago and New York, will have Pittsburg terminals to secure an immense tonnage from that city, and will also tap the rich bituminous and anthracite coal fields of Pennsylvania.

OBITUARY.

A. A. Nimmons, a manufacturer of ornamental iron at McKeesport, Pa., died recently at the age of 51.

Charles A. Bragg, district office manager of the Westinghouse Electric & Mfg. Co., Philadelphia, died July 29 at the age of 56.

William J. Shields, well known as an inventor of electric appliances, died Aug. 9, at New Wilmington, Pa., at the age of 40.

William S. Boyd, manager of the Scranton Supply & Machinery Co., Scranton, Pa., died suddenly July 28, at the age of 45.

William Rosengarten, a prominent inventor and street car manufacturer of Philadelphia, died recently at Boulder, Col. He had retired from business several years ago.

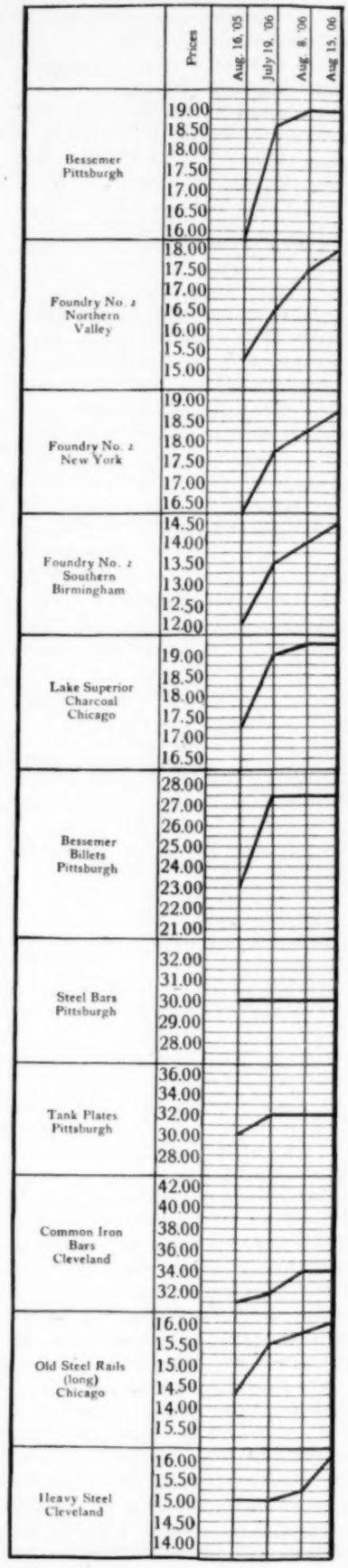
Thomas F. Morrin, president of the Morrin Climax Boiler Co., Brooklyn, and inventor of a number of improved appliances in machinery, died of apoplexy July 31 at his home in Jersey City, at the age of 56.

Robert H. Ten Broek, for years connected with the Ames Spike & Bolt Co., Jersey City, N. J., died at his home in Bayonne, N. J., Aug. 6, aged 42. He was at one time president of the First Albany bank and judge of the Albany court of common pleas.

James T. Davis, general manager of the Standard Chain Co., Pittsburg, died a few days ago at his home in Nottingham, near Cleveland. He was general manager of the Baker Chain & Wagon Mfg. Co. at the time of its absorption by the Standard Chain Co. some years ago, and continued with the latter concern until ill health forced him to give up his duties about a year ago. He was 65 years of age.

Joshua Regester, for many years engaged in bell casting and brass founding, died at Baltimore, July 31, at the age of 90. He was born in Maryland in 1816 and at the age of 16 he entered the employ of the Sharrer Brass Works, Baltimore. In 1844 he organized the firm of Clampett & Regester which subsequently became Regester & Webb then Joshua Regester and next J. Regester & Son. He leaves a widow and four children.

PRICE CHART.



PERSONALS.

W. C. Runyon, president of the Struthers Furnace Co., Cleveland, has returned from Europe.

J. E. Rawson, of Otis, Bonnell & Co., Cleveland, is spending his vacation in the Adirondacks.

Fred Perkins, superintendent of the Perkins Machine Co., Warren, Mass., is abroad on a business trip.

Charles Neumeyer is the new superintendent of the Harrisburg Pipe & Pipe Bending Co.'s steel plant.

E. D. Rogers, Cleveland sales manager for the Cambria Steel Co., is at Kawartha Lakes, Ont., for a vacation.

E. B. Tenny succeeds Howard A. Knauss as blast furnace superintendent of the Northern Iron Co., Standish, N. Y.

Norman W. Parlee, mining engineer of the Nova Scotia Steel & Coal Co., at Wabana, Newfoundland, has resigned.

James I. Stephenson, vice president of the Cincinnati Iron Store Co., has returned from a vacation of several weeks at Magnolia Beach, Mass.

W. H. Higgins, secretary of the Wheeling Steel & Iron Co., accompanied by his family, has been spending his vacation at Canadian points.

George Williams has been made assistant to the superintendent of the Foos Gas Engine Co., Springfield, O. Harry Bray has been advanced to general foreman.

F. K. Shults has been appointed sales agent of the American Steel Foundries and of the Simplex Railway Appliance Co., with headquarters in New York.

E. I. Smith, until recently general foreman of the Vulcan Iron Works, Denver, Col., has become superintendent of the shops of the John A. Traylor Machinery Co., in that city.

William Burns, assistant superintendent of the Pennsylvania Steel Casting Co., at Chester, Pa., has entered the services of the Baldwin Locomotive Works at Eddystone, Pa.

Thomas H. Roberts has retired as general superintendent of the J. D. Connell Iron Works, New Orleans, La., to accept a similar position with the Stern Foundry & Machine Co.

Isaac A. Brown, for 12 years superintendent of transportation at the Ohio plant of the Carnegie Steel Co., Youngstown, O., has resigned, and has been succeeded by Robert Stickney.

Gilbert Prentiss, general manager of the Racine, Wis., plant of the American Skein & Foundry Co., has resigned. No successor has been appointed, his duties having been assumed by other officers.

J. M. Lloyd, superintendent of the open-hearth department of the Carnegie Steel Co., South Sharon, Pa., has resigned to become superintendent Sept. 1 of the open-hearth furnaces of the Jones & Laughlin Steel Co.

F. E. Porter, superintendent of the open-hearth furnaces at the Ensley plant of the Tennessee Coal, Iron & Railroad Co. has resigned and gone to Europe for a vacation, after which he will be located in Buffalo.

Alonzo H. Knapp has been elected president of the Passaic Steel Co. to succeed Niven McConnell. The offices of superintendent and general manager left vacant by the withdrawal of McConnell will be filled later.

Benj. D. Fuller, who has been in charge of the Allegheny Foundry of the Westinghouse Electric & Mfg. Co., has been appointed general superintendent of the company's plant in Allegheny and Cleveland, O.

Joseph Ripley has been made principal assistant engineer of the Isthmian Canal Commission, and will have charge of the preparation of plans for the locks and regulating works. He assisted in the construction of the Sault Ste. Marie canal.

Harry Campbell, for some years employed at the plant of the Carnegie Steel Co., at South Sharon, and later at the Lackawanna plant, at Buffalo, has been placed in charge of the universal plate mill at the plant of the Youngstown Sheet & Tube Co.

Harry McEldowney has been appointed assistant superintendent of the Bessemer plant of the Republic Iron & Steel Co., at Youngstown, O., vice Albert Patton, who has been made general superintendent of the steel mill of the National Tube Co. at McKeesport.

Horace R. Thayer has been appointed instructor in structural engineering in the Carnegie Technical Schools. He is an engineer of experience, having been employed by the American Bridge Co., Heyl & Patterson and at the Portsmouth navy yard as chief engineer.

The Youngstown Sheet & Tube Co. has created a new office for C. S. Robinson, formerly general manager of the Colorado Iron & Fuel Co. He has been made second vice president and general manager and will have exclusive control of the operating department. Since the company was organized James A. Campbell, now president, has held the position first of vice president and general manager and later of president and general manager.

Andrew H. Dunlap, master mechanic of the Pratt Mines division of the Tennessee Coal, Iron & Railroad Co., has resigned after a service of twenty years in this capacity. He will assume a similar position with the Tennessee-Republic Co. E. Burke, who has been in the employ of the Southern Steel Co., will succeed him.

Several changes have been made recently in the superintendents and other working forces at the steel plant of the Tennessee Coal, Iron & Railroad Co., the vacancies being filled about as fast as the resignations are received. Among the last to tender his resignation was Al. C. Ryan, who has been superintendent of the blooming mill and rail departments of the plant almost since the industry has been located at Ensley. Mr. Ryan is going with a steel concern at Bethlehem, and will leave Birmingham about Sept. 1.

CANADIAN EXTENSIONS.

The Dominion Wire Mfg. Co., of Dominion, near Montreal, will shortly erect an open-hearth furnace, blooming mill and combined rod and merchant mill in connection with its present works, involving an expenditure of $500,000. President F. W. Fairman has just returned from Pittsburg where he made a close inspection of many plants of a similar character. The services of W. H. Farrell, formerly superintendent of one of the mills of the American Steel & Wire Co., have been secured as manager, and the construction of the new furnace and mills will be under his direction. The new plant will give employment to 100 additional men.

Elevator Plants Sold.—The Otis Elevator Co. has purchased the O'Donnell Elevator Co., of Cleveland, O., and the Detroit and Buffalo plants of the Gardner Elevator Co. M. J. O'Donnell, president of the Cleveland concern, will manage the Otis company's interests in that city, A. H. Wright, former manager, going to Springfield. R. W. Gardner will manage the Buffalo plant and Oliver W. Gardner the Detroit plant.

Ore Supply Obtained.—The Midland Steel Co., of Pittsburg, with its new blast furnace and steel plant at Midland, Pa., has provided its iron ore supply by purchasing a tract of ore lands, comprising 240 acres in section 30, town 63, range 11, from the Shagawa Iron Co. The land is unexplored, but is in the heart of the ore region. The company's blast furnace will be blown in Sept. 1.

COPPER COUNTRY

VISITED BY LAKE SUPERIOR MINING INSTITUTE.

Notes on Old and New Equipment.—Man-Made Earthquakes, Diseases of Miners and Other Subjects Discussed.—The New Officers.

(Staff Correspondence.)

Houghton, Mich., Aug. 10.—The twelfth annual meeting of the Lake Superior Mining Institute, held at Houghton, in the heart of the copper country, August 8-9-10, has in its turn become a part of the "proceedings." Characterized by splendid weather, visits to mines unique in many respects, and by an attendance of 327 members and guests, the largest attendance in years, this twelfth meeting came to a conclusion most successfully. The committee in charge of arrangements, of which W. D. Calverly was chairman, saw to it that provision was made for all the wants of the visitors. Many arrived on Tuesday, but the majority reached Houghton at noon Wednesday, delayed trains bunching the arrivals so that a temporary confusion regarding accommodations arose, which, however, straightened itself out as the plans of the committee became known to the visitors. The Douglas house served as headquarters for the officers of the institute and a goodly number of the members, but the remainder enjoyed the novelty of being the first guests at the new Scott hotel in Hancock, a circumstance provocative of many enjoyable and amusing incidents.

Immediately upon registering, each member obtained a tasteful copper medallion and guard on which was written his name, so that the hotel corridor presented an animated scene of old acquaintances renewed and new ones cordially made. A grand rush for dinner ensued, for the program began promptly at 1:45.

WEDNESDAY'S SESSION.

In the morning those who had spent the night in the city or had arrived early visited the Michigan School of Mines, where the excellent collection of mineral specimens and the models showing methods of mining, particularly the Baltic, were viewed with great interest and entertainingly explained by Prof. F. W. Sperr and his assistants.

In the afternoon the program called for a trip to the mines at Calumet. A special train over the Mineral Range road had been provided by Chairman F . W. Denton, of the transportation committee, and at 2:10 it pulled out with everyone present, though the St. Paul contingent had to run from their train, which arrived late, and had to defer lunch until reaching Calumet. An hour's ride brought the party to this famous copper town and none too soon, judging from the speed with which the unfed delegation departed in search of sandwiches and such other famine preventers as could be obtained. Owing to a blocking of the track the remainder left the train and walked the short distance to the **Tamarack No. 5** vertical shaft, sturdy Peter White trudging merrily along with the youngest. This shaft, the second deepest in the world, 5,080 feet, with its immense Nordberg hoisting engines and compressors, was the object of great interest. These engines, built a number of years ago, with no thought of economy and an elaboration of detail that now is entirely avoided, were an object of admiration as mechanisms, but would merit descriptions only as curiosities, for while they do the work the present sentiment in favor of simplicity in design which makes their duplication impossible is forcibly indicated in the newer plants at the Mohawk, Allouez and Ahmeek shafts where Nordberg engines of equal power take the form of the ordinary horizontal engine.

An hour was spent at Tamarack No. 5 going through the rock house, boiler plant and viewing the engines.

A Trip in Flat Cars.

From here the crowd was carried on a train of flat cars with improvised plank benches, over the Hecla & Torch Lake railway to the Whiting shaft or Superior power house where are installed the well-known and immense vertical, twin, triple-expansion engines which have gained renown for their size and complexity. In striking contrast was a horizontal Corliss, in a neighboring building, an engine of the type built in Providence in 1890.

From there the flat car "special" proceeded to the Red Jacket shaft of the Calumet & Hecla Co. This vertical shaft, 4,900 feet deep, is one corner of a triangle, at the other points of which are the other two deepest shafts in the world, Tamarack No. 5, 5,080 feet, and No. 3, 5,200 feet. Here, too, the tremendous engines and hoisting drums, 25 feet in diameter, were objects of curiosity.

The Whiting shaft was distinguished by the method of hoisting, where no drums were used, but an engine rope with a 150-foot tail rope and two flywheel sheaves. At the Red Jacket is located the only Kimberly, or as it is called in the iron country, Debeers, skip hoist in the copper country.

From the Red Jacket shaft the crowd scattered to the Calumet Club and the various hotels where they were entertained at dinner.

Dr. Lane's Paper.

At 8:30 the first meeting was called to order by President James MacNaughton, in the Washington school auditorium at Calumet. With a few words of welcome to the copper country and of congratulation upon the conditions of the institute, the president introduced Dr. Alfred C. Lane, state geologist, who presented a paper entitled "The Geology of Keweenaw Point—A Brief Description." The paper had been in the hands of the members previously and Dr. Lane simply took occasion to emphasize certain portions of it. Referring to a part of Dr. Lane's paper concerning the "ice marks on Keweenaw Point," the president called attention to the uniform east and west direction of the ice marks, an exception to which near Greenleaf where the strike of the ice marks is nearly north and south, was cited by Mr. Deaton and acknowledged by Dr. Lane. In reply to Mr. James Kelly's inquiry regarding the source of the copper deposits, Dr. Lane replied that it was largely guess work, but he guessed that the copper was thrown down in a chemical or electrolytic reaction during the transition of the upper waters containing sodium chlorides into the lower waters which are strongly calcium chlorides, and by the action of the chlorine contained in those waters.

Five Years of Progress.

There being no further discussion, Mr. J. F. Jackson read his paper on "Five Years of Progress in the Lake Superior Copper Country," presenting a brief review of activities at the various properties and calling attention to some novel improvements at properties to be visited by the institute. In his paper Mr. Jackson referred to the recent disturbance emanating from the Calumet mine as a "man made earthquake," which provoked considerable information and conjecture relative to the effects and causes of the shock.

The report of the committee on "pins" was called for and submitted by Mr. Kelly, who presented as the report the pin which consists of gold sledge and hammer and the letters L. S. M. I. mounted on an oxidized metal

background representing a section through a hexagonal bar of steel, price $4.00. The report was accepted and the committee discharged.

An auditing committee consisting of C. E. Lawrence, D. T. Morgan and C. C. Jones, and a nominating committee consisting of William Kelly, George A. Newett, George D. Swift, George Abeel and F. W. Denton, were appointed. With the grateful announcement that the train would not leave the following morning until 9:00, instead of at 7:45, as scheduled, the meeting was adjourned, everyone rounded up and the special train started for Houghton.

THURSDAY'S SESSION.

Shortly after 9 o'clock the special train left Houghton for the country north of Calumet, where some of the newer properties were visited. In most respects the mining in the copper country is quite analogous to the mining at the older underground iron mines. The copper mines are older and the shafts deeper, some of the machinery more magnificent, but generally speaking the contrast is not great. In one point, however, the distinction is novel. The copper mine is still new when it is five years old, so long does it take to get at the deposit. An iron mine, especially in these later days, is old much earlier. So it was that the "new" copper mines were visited on Thursday.

The Mohawk.

The Mohawk was first reached, where power for the hoist is developed by twin 24 x 60-inch horizontal Nordberg engines, four engines in all, and two 18 feet 4 inch drums, representing about 3,500 horsepower. Two Ingersoll-Sergeant air compressors of a capacity of 5,000 cubic feet of free air per minute supplied the mine with air. The rock house and dump also came in for a considerable degree of interest. A speed of 5,000 feet a minute is maintained on some of the hoists, which makes the operation of the skip worthy of considerable notice.

The stock pile of the Mohawk mine was also an object of interest because of the new mineral, Mohawkite, recently discovered by Dr. George A. Koenig, of the Michigan School of Mines, and mined at this property. The mineral is an entirely new combination of copper arsenites and many specimens were carried away by the visitors.

Ahmeek and Allouez Shafts.

The train then proceeded to the Ahmeek mine where there are two shafts about three or four years old and where a new rock house is being built, in which concrete is being used to a great extent. The foundations and rock bins are of concrete and the skip runway, as mentioned in Mr. Jackson's paper, is of concrete. This runway is built in sections. The rail, supported by cross-pieces, is laid centrally above the wooden concrete mold and is tied down by flanges and bolts that run down through the concrete and act also as a reinforcement. This construction is much more expensive than the rock runway, but prevents, it is claimed, any displacement of the rails.

The power plants at the Ahmeek and Allouez shaft, which was visited next, are similar to that at the Mohawk with some small increase in size of engine cylinders. The plant at Ahmeek is just being installed and all of the hoisting cable has not been put on the drums as yet, so the engines are not all in operation. The brake on the drum at this mine is worthy of mention, as it avoids the "shuddering" action common to band brakes. The brake consists of an adjustable shoe fitting on the drum and exerting pressure from beneath. An immense weight, acting through a lever, is the braking force and the release only is operated by steam pressure and controlled by the operator.

While at the Ahmeek a lunch of sandwiches, lemonade and "something" in bottles was served from the baggage car door—a buffet lunch, correct in every detail, save quantity. After the Allouez shaft had been visited a hurried retreat was beaten to Calumet, where the town was depopulated of eatables. The train left Calumet at 2:50 for Houghton and the ball game. A small party was taken underground at the Wolverine mine by Capt. Pollard, but everyone turned up in Houghton at 6 o'clock.

Causes of Diseases.

The evening session was called to order by President MacNaughton at 8:30 and the paper of the evening at once presented. The paper, "Mine Sanitation—The Importance of Ordinary Sanitary Precautions in the Prevention of Water Transmitted Diseases in Mines," was read. In the absence of Dr. Jones, of Vulcan, the writer of the paper, it was read by Mr. Kelly, who attacked the medical terms with commendable bravery, much to the entertainment of those who listened. The paper, which pointed out the dangers and channels of contagion resulting from the uncleanly practices in many mines, evoked some suggestions of deep import. While Mr. Kelly did not feel himself prepared to invite a discussion of the paper from a medical standpoint, in response to President MacNaughton's inquiry, he told of measures that were being adopted in England and Australia for the prevention of the spreading of consumption among the miners. He was followed by Dr. F. H. Koenig, who in a most interesting manner discussed the classification of causes of pulmonary troubles arising from the various dust-producing occupations. The second paper of the evening, by Dr. Abbott, of Hazel Green, Wisconsin, on the "Iron Ore Deposits of the Vermillion Basin," was read by title only.

Man-Made Earthquakes.

The question of "man-made earthquakes" was again brought up by the president in consequence of considerable inquiry and discussion aroused by the reading of Mr. Jackson's paper. An effort was made to determine just what was meant by the earthquake referred to and to distinguish it and its causes from the disturbances at the Atlantic and Quincy mines which were due to the movement of rock masses under compression and from the "air blasts" arising from the continual snapping off of pieces of rock under a condition of strain. Dr. Lane, Dr. L. L. Hubbard, Mr. Denton, Dr. McNair and Prof. Sperr were called upon and with others offered various opinions, among them that the region was still in a condition subject to earth disturbances and therefore the earthquake might be perfectly natural. It was also suggested that the earthquake resulted from strains produced by the "creep" of the rock layers, owing to the fact that pillars were left in the mine to act as levers, instead of taking everything out and caving it down.

The report of the council by Secretary Yungbluth was then given. It included a financial statement, the submission of 57 new applications and the recommendation that the secretary's salary be raised from $500 to $750 a year.

The financial statement was as follows:

Receipts—	
Balance Oct. 17, 1905	$3,639
Receipts during year	2,395
Total	$6,034
Disbursements—	
Clerical expenses, ptg., etc.	1,638
Cash on hand Aug. 8, 1906	4,396
Total	$6,034

The New Officers.

Following the report of the auditing committee, the nominating committee presented the following list of names as officers for the ensuing year:

President, Thomas F. Cole, of Duluth; vice presidents (newly elected),

D. T. Morgan of Republic, D. E. Sutherland of Ironwood and Norman W. Haire of Houghton; managers (newly elected), J. W. Amberg of Chicago, Pentecost Mitchell of Duluth and John C. Greenway of Bovey, Minn.; secretary, A. J. Yungbluth, of Ishpeming; treasurer, E. W. Hopkins of Commonwealth

A ballot being required it was cast by the secretary unanimously electing the above men.

J. H. Hearding, general superintendent at Eveleth, suggested that a committee be appointed to provide for the preparation of sketches of the lives and experiences of the many notable men who have been connected with the development of this, the oldest mining region of the north country and that such sketches be made a part of the proceedings of the institute. The suggestion was heartily endorsed. A vote of thanks was tendered to all those who had contributed to the entertainment and transportation of the institute members and the meeting was adjourned. Some of the members immediately retired. Others didn't.

FRIDAY'S SESSION.

The program for the third day provided a trip on the special train over the Copper Range road, leaving Houghton at 8 a. m. for the south range. Some of the party went to Lake Linden, visiting the Calumet and Hecla stamp mills. The party traveling to the south range visited the Michigan smelter, the Baltic stamp mill at Redridge, the Champion, Baltic and Atlantic mines, returning to Houghton about 2 p. m. This trip proved particularly interesting and made a fitting wind-up to the various expeditions. The members began scattering later in the afternoon and midnight Friday closed a very successful meeting, one which in the matter of attendance far exceeded expectations.

Probably on account of the fact that the meeting was held in the copper country, the papers and discussions related largely to copper mining and were of less interest than usual to those connected with iron mining.

For the six months ending June 30, the Pittsburg Coal Co. made a gain in net earnings of $331,103.27 over the corresponding period of 1905. Its coke production increased 46,422 tons.

At the Wyandotte yard of the Detroit Ship Building Co., the steamer Samuel Mather, building for the Mesabi Steamship Co., a corporation affiliated with Pickands, Mather & Co., Cleveland, was launched July 28.

LARGER ORDERS

Develop in British Iron Trade.—Depression at an End.

(Special Correspondence.)

Birmingham, Eng., Aug. 4.—There seems to be an end of the depression which has been prevailing for some months past, as far as the pig iron trade is concerned. Orders are now coming in much more satisfactorily, and instead of the paltry lots ordered by users for some time past, orders of several thousand tons are becoming common. Several of the local merchants have refused orders for Northampton, and Derbyshire varieties, at from 6d to 9d ton advance. A very notable circumstance was the refusal last week of the makers of cold blast pig iron to reduce their material, concurrently with the reduction in marked bars. This is the first time in local experience that such a thing has happened, and it is recognized as a hopeful fact. The orders for finished iron are decidedly improving, and a reaction in favor of wrought iron sheets, owing to the experience of corrosion in steel varieties, is keeping the local mills very busy. Orders for strip are coming in much better, and an advance is promised. Makers are very hopeful in regard to the autumn trade.

The accountants of the Midland Iron and Steel Works Board have just issued their bi-monthly circular as to prices of iron sold by the seventeen firms whose sales fix wages. Puddlers' wages will be unchanged at 9s per ton during the next two months. During May and June the average price was £6 18s 6.88d per ton, as compared with £6 18s 3.17d per ton during the previous two months. The slightness of the change has caused some little surprise. The effect of the boom contracts and the recent reductions are now evidently just balancing each other.

The Consett Iron Co. has had another splendid year. The report just issued shows a profit for the year of £303,000, allowing a distribution of 27½ per cent dividend as compared with 25 per cent for the two previous years. There is still an undivided profit of £150,000, which is partly to be devoted to the construction of a new blast furnace, in course of erection. The allied undertaking of the Consett Spanish Ore Co. pays the phenomenal dividend of 12s 9d per £1 share or 63¾ per cent, though this is below that of the previous year, when 67½ per cent was paid.

The Normanby Iron Works Co., Ltd., shows a profit of £26,481, out of which it pays three years' dividend at the rate of 6 per cent on the preference shares. The directors report that the year's working shows a decided improvement. Toward the end of 1905 there was a marked increase in the demand for hematite iron, but the highest point reached has not been maintained.

There has been a very significant breeze in connection with the effort of a local company, the Birmingham Small Arms Co., a firm employing about 5,000 hands, to establish an inner secret reserve. The directors have, after a stiff fight, secured power after paying a ten per cent dividend, to set aside the remainder of their profits for any purpose they please, without explaining such use to the shareholders. The interest to the iron trade lies in the statement made during the discussion by Eric Carter, the shareholders' auditor, that he was auditor to Guest, Keen & Nettlefold, one of our biggest iron and steel concerns and to the original firm of Messrs. Nettlefold, who thirteen years ago established such a reserve. In this and several other cases, the result had been entirely to the advantage of the shareholders. It was admitted that Messrs. Kynochs, who include in their numerous industries that of steel anchor casting, have also a secret reserve. Mr. Leitner, a well-known director of the great steel industries, pointed out that such a reserve is invaluable where plant and machinery have to be scrapped. "It is not now as it was years ago," he remarked, "when plant and machinery would last as long as it would hold together." The change, it may be added, is a sign of the times indicating how capitalists and heads of great concerns are equipping themselves for the competitive fight in which the most modern machinery and the best-equipped capitalist wins.

Every department at the big Brown-Bonnell mill of the Republic Iron & Steel company at Youngstown, O., is operating excepting the 18-inch continuous mill. This department has been idle since July 1. At the conference between the A. A. conferees and Charles Hart at the head of the operating department of the Republic Iron & Steel Co. mills held during last June in Pittsburg it was mutually agreed that the wage scale on this mill should be settled locally. At a conference held some weeks ago the district board of the A. A. and the Republic Iron & Steel officials failed to agree. An additional reduction of two per cent is demanded from the catcher and roughers.

DEVELOPMENT OF THE ROE PUDDLING PROCESS.[1]

BY JAMES P. ROE.

The arduous character of the work in puddling and its consequent high cost early suggested the desirability of lessening them by the introduction of mechanical means. These means have assumed various forms too numerous to be discussed in detail here. The puddling process is really very simple and early appealed to the writer as one that permitted of mechanical solution provided it was approached directly as a process and tradition was ignored. Further it seemed to me necessary that mechanical means should be utilized with large units and the metal handled directly from the blast furnace, that is, the same broad means that have made possible the low costs in the modern production of steel should be utilized as far as possible. In looking over the field for means of agitation, that of simply flowing by gravitation had strong attractions due to its simplicity; that is, given an inclined trough properly enclosed and heated, whose angle with the horizontal increased as it descended, lined either with oxide of iron or some neutral metal, then have a mass of molten iron and cinder poured in at the top; a crudely shaped ball should result theoretically by the time the metal reaches the bottom, provided the trough was long enough. Although attractive, the proposition was impracticable because it was ill adapted for experimental purposes on account of expense, a trough about 2,000 feet long and elevated 600 feet at the top being necessary, and also because the cinder would almost always separate itself from the iron and lead in the race for the bottom, it being more fluid at most stages of the process and the iron being retarded by friction at the bottom.

The underlying thought was that the long incline with the wave effect it naturally produced was good. Following along this line it became evident that a trough of considerable length down which the bath could flow, first in one direction and then in the other, would possess all the advantages of the long fixed trough, together with the additional one of a sudden arrest at each end, by which the bath would be forced through itself and greatly increased thoroughness of mixture would be obtained.

The first trough was made 28 feet long. The details of the machine are shown in longitudinal and cross-sections in Figs. 1 and 2. Two long girders formed the substructure, upon which all of the moving parts rested. These were suspended from two hollow trunnions placed opposite each other at the middle of the length. Flames from two stationary coal fire-chambers passed through the trunnions into the furnace and out of the stacks at each end. The trough, forming the bottom, was made double of steel plates, water passing through to preserve the covering.

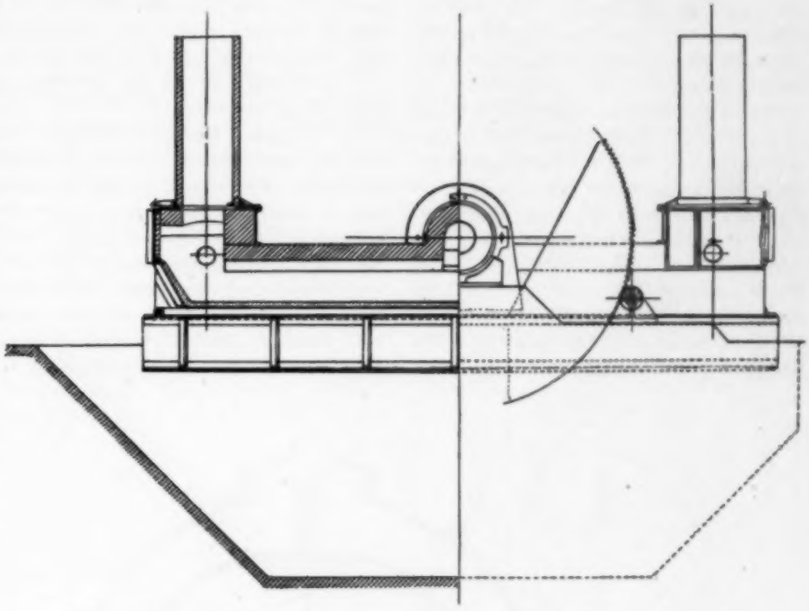


FIG. 1.—LONGITUDINAL SECTION OF ORIGINAL ROE PUDDLING MACHINE.

The question as to the material to be used for the first working bottom was important and complex. There being no definite data on which to base a decision, it was finally decided to lay a course of ordinary fire brick on the flat, and to tamp on this two inches of roll scale and tar. It was not anticipated that the cooling influence of the water would be sufficiently felt through the brick to prevent them from combining with the oxide of iron of the covering, but it was hoped that it would last long enough to give valuable data.

The first heat lasted twenty minutes up to the drop of the bath. Immediately after the drop the iron failed to show at the lower end of the furnace. On looking in at the back, the mass

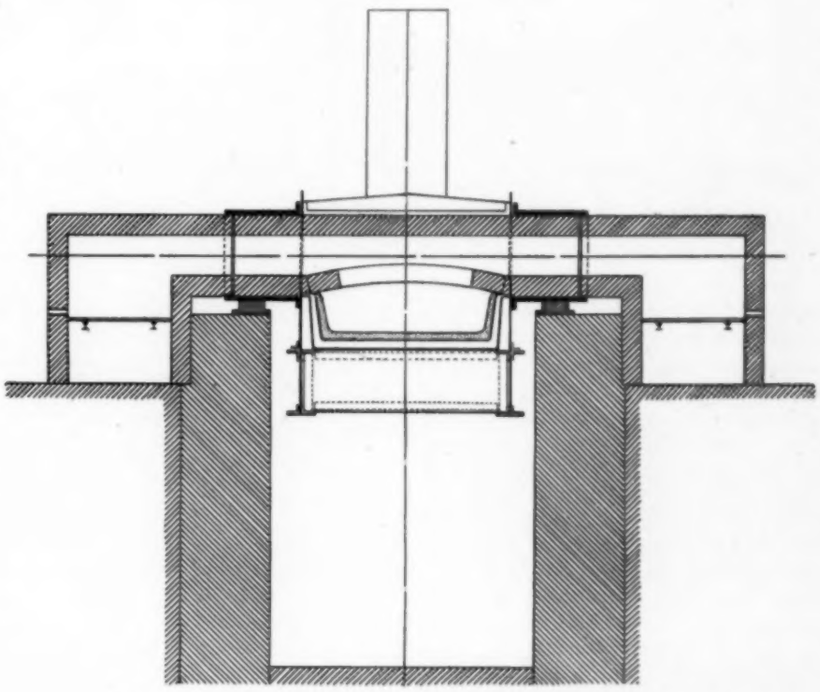


FIG. 2.—CROSS SECTION OF ORIGINAL ROE PUDDLING MACHINE.

[1]Abstract of a paper presented at the London (July, 1906), meeting of the Iron and Steel Institute.

was seen to be stuck at the middle. After several rapid oscillations at the angle of 50 degrees the bottom itself became loose.

Before the next bottom was dry one of the caulked joints of the steel trough sprang a leak, and it was deemed inadvisable to continue experiments on this structure with its large plane surface remaining horizontal for an appreciable period, tending to form steam pockets. A new trough was, therefore, built of small pipe, the sides being at an angle of 45 degrees. The working bottom and sides were composed of 75 per cent ground Grecian magnesite and 25 per cent roll scale. When this was heated 700 pounds of puddle tap was melted on it. The first heat, 1,600 pounds in weight, was a small one, taking one hour and twenty minutes. Several balls were formed instead of the one hoped for. When these balls were rolled into puddle bars the iron showed up very well. After a delay caused by a broken water pipe, three heats were made, weighing 1,000 pounds each. The time was 32, 33 and 42 minutes respectively. The iron was well puddled, but contained pieces of magnesite from the sides and bottom, which caused blisters in the iron when worked. This was repeating the history of former attempts at mechanical puddling.

The original thought was that the bottom and sides should be self-maintaining, that is, should be able to maintain a relatively uniform thickness by balancing the influences of the heat and scorification by means of the cooling influence of the water, such as in the case of the blast furnace bosh, and thus do away with all fettling. The original covering was only intended to preserve the trough until this balance was obtained. Reasoning along this line, in view of the difficulty in keeping the magnesia sides in place, it was only carrying the experiment a little further to do away with the original lining and to rely entirely on the chilling of cinder on the pipes. The next move, therefore, was to cover the bottom as before, but leave the side pipes bare, merely coating them with boiled linseed oil to close up the interstices and to prevent the passage of air or gas. This was tried, but was a failure, since we could not obtain sufficiently high temperature in the presence of so large an exposed water cooled surface.

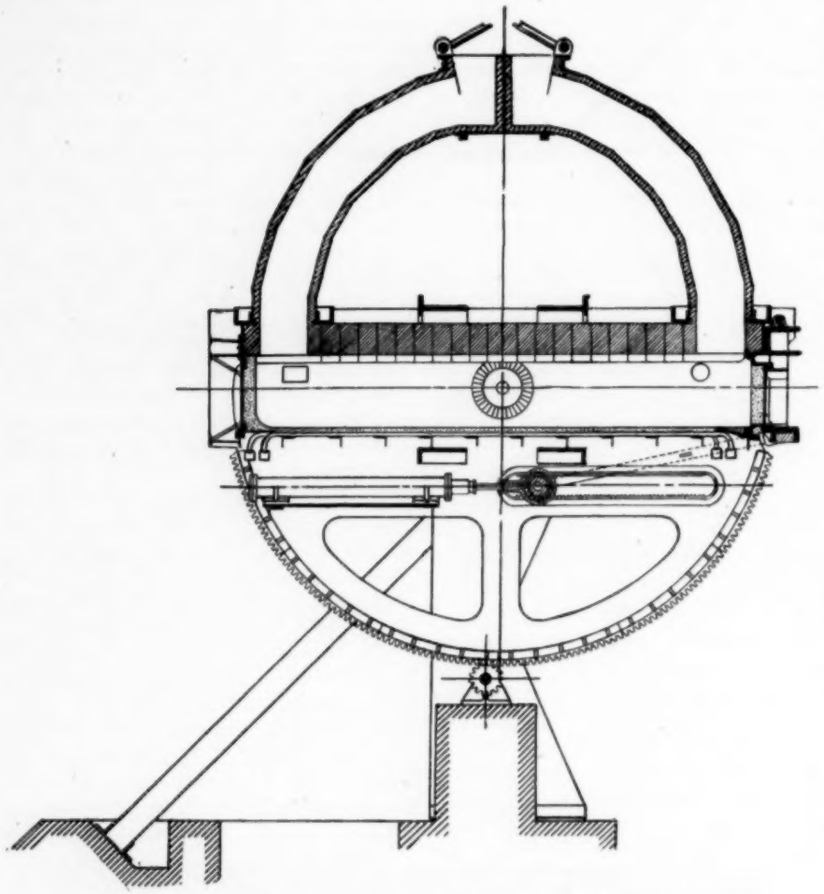


FIG. 3.—LONGITUDINAL SECTION OF IMPROVED ROE PUDDLING MACHINE.

Vertical sides to the trough were next tried. The lower pipes touched each other, while the upper ones had spaces between them equal to their diameter. T-shaped fire bricks were inserted in these spaces, producing a flat inner surface, the idea being that they would be cut away on the inside by the wash of the cinder and would be replaced by its congealing. The length of the hearth at the same time was reduced from 28 to 20 feet as it had become evident that it was longer than was essential to the process and was too long for the heating capacity as then existing. The bottom and lower portion of the sides were lined with roll scale and nine per cent of tar was rammed into place.

Several successful heats were then made, producing good iron. The heats averaged 1,200 pounds and lasted 30 minutes. Many of these heats were made from iron coming directly from the blast furnace.

Up to this time but little attention had been given to the disposal of the puddle ball after it was made. As the work proceeded I became convinced that in order to carry out the idea of using large units, the mass must be maintained in its integrity up to the point that is reached in modern steel practice, that is, up to the slab or billet. The puddling machine, therefore, must have the capacity to produce a ball which would approximate the weight of the steel ingot. The ball must be squeezed, rolled on a blooming mill and cut to lengths in slabs or billets. When this was accomplished the low price of the modern steel plant should be attainable.

The existence of a blooming mill in an abandoned Bessemer plant decided the location of the new furnace. From the longitudinal cross-sections, Figs. 3 and 4, it will be noticed that this furnace differs considerably in detail from the first, both in general appearance and in detail. The side plates of the furnace, or trough, have also the function of girders and are extended downwards, and have racks on their peripheries, which gear into pinions on a countershaft. The stacks, four in number, are so placed as to produce as even a distribution of the flame and temperature in the furnace as possible. They converge above the axis of the trunnions where they meet for the double purpose of clearing the platform around the furnace and of keeping the gases in balance at any angle. This construction also prevents the ingress of air through the lower

pair of stacks, which would decrease the temperature and oxidize the iron. The door, forming the whole of one end, is operated by means of a hydraulic cylinder placed horizontally in the furnace, which drives a revolving cross head.

The door is constructed in a series of sections nine inches wide in order to avoid distortion by heat and the lining bricks are held in these sections by dovetails. The sections are fastened to girders at the top and bottom of the door and the bottom girder has a trunnion at each end to receive the connecting rods. The edges of the door are sharply convex in form, while the sill, lintel and jambs are also convex, but have a larger radius. The result of this construction is that when the two convex surfaces are forced together by means of the wedges which lock the door, the adhering cinder from the previous heat is ground off and the door is tightly closed. The sill and lintel are water cooled in order to chill the molten cinder when it strikes them and thus seal the joint and prevent the egress of iron.

The trunnions carry the whole weight of the machine which it so balanced that it has a slight tendency to return to a horizontal position, and as a consequence but little power is required for operation. The heating agents are admitted through the trunnions as before. Oil was adopted for fuel for a number of reasons, chief among which was cheapness of installation. The oil is heated by steam and conducted to the machine, the last three feet of the pipe being steam-jacketed. The oil then passes through a burner in which it is atomized by air under six pounds pressure. As it enters the trunnions it meets the first portion of the air for combustion, which is supplied under a pressure of six ounces. A little further on the rest of this blast is admitted so as to give a gyratory motion to the flame. The two flames, whirling in opposite directions, impinge on each other at the center of the furnace. A very perfect mixture and combustion result, producing a uniform and effective heat. The mains for the blast are brought up to the axis of the machine at one side, while the cooling water comes in at the axis at the other side. Since the temperatures to be handled are comparatively low, the roof is built of fire-brick to reduce radiation.

Seven observation holes are provided, through one of which oxidizing agents are charged by means of a spoon reaching across the furnace. A tapping hole in the rear end is used for bleeding, if desired. The use of the long spoon enables the oxidizing agents to be added all the way across the furnace at the same instant and insures their equal distribution. The sides and bottom of the first trough were constructed as in the earlier machine. The door and back wall were lined with fire brick and carefully keyed in.

Coincident with the building of the new machine, a squeezer had been designed and built. The conditions to be met by it were that the puddled mass, or ball, should be received with the least possible loss of time after its consolidation in the puddler; the product should approximate the form of a steel ingot, adapted to rolling in the blooming or plate mill; and the cinder should be removed in a uniformly efficient manner from the whole of the mass—from the center to the surface.

The first condition demanded that the squeezer should be mobile so that it could be brought to each puddling machine in a plant as it was needed. The second condition indicated that the pressure should be applied in the two horizontal directions and in the vertical direction, either successively or simultaneously, as desired. The third condition indicated the application of the pressure for an appreciable time in one direction, this being the most effective means of influencing the interior of a semi-mobile mass. It was also argued that if sufficient pressure be applied to a mechanical compound and be maintained for a sufficient time, the more mobile of the constituents will exude from the mass, provided there is opportunity for its escape, until an irreducible residue is reached which will be held by cohesion. It was, therefore, determined that hydraulic power should be used, applied by cylinders acting in the three directions, and that slots should be provided in the surfaces coming in contact with the mass in order to allow free egress for the cinder. It is quite evident that the pressure, applied in the way described, would be much more effective than that of a rotary squeezer, since the direction of pressure is continually changing in the latter, as the ball moves forward, and the channels for the egress of the cinder just established are sealed up again by contact with the cylinder and

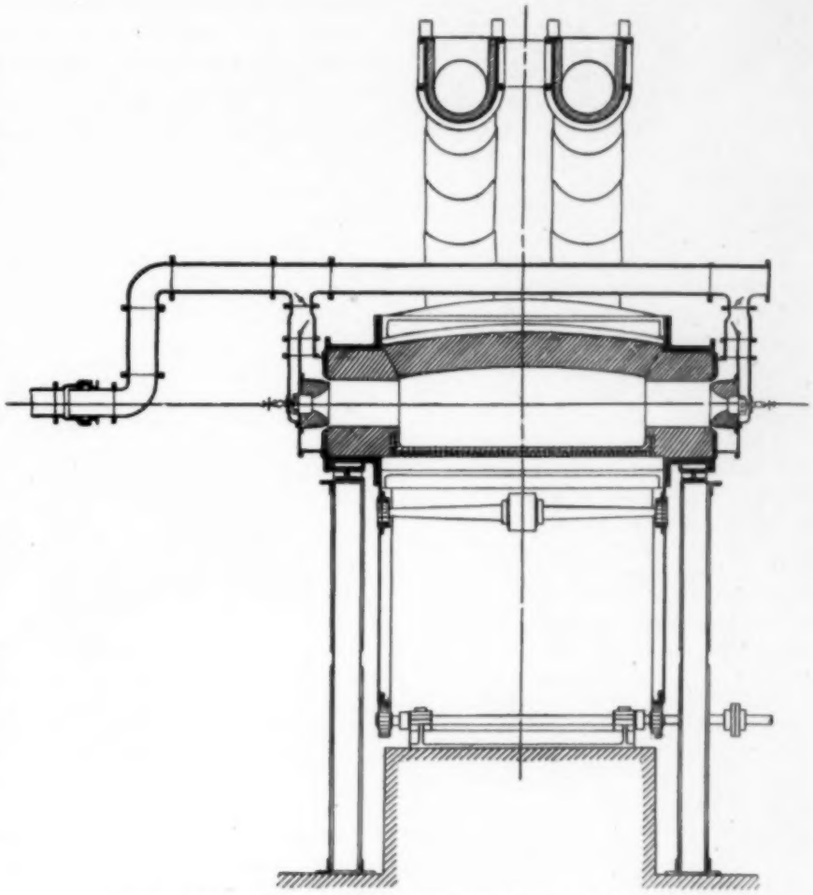


Fig. 4.—Cross Section of Improved Roe Puddling Machine.

segments. A pressure of 2,000 pounds per square inch was determined on as the power required. Fig. 5 is a perspective rear view of the squeezer. Its weight is 150 tons.

As already explained, one of the important features in this process was the abandonment of all fettling, and the charging of all cinder and oxidizing agents. An auxiliary furnace for melting the cinder was necessary and was built much in the form of an ordinary puddling furnace, oil being employed as fuel. The building of this furnace, with a stationary hearth, proved a serious drawback, and the use of a tilting furnace was afterwards strongly indicated. Cupolas were first used for melting the pig iron as the work was too irregular at first to allow the use of iron direct from the blast furnace.

Numerous troubles developed with the dampers, and asbestos dampers held together by light wrought iron frames were finally developed and proved entirely satisfactory.

The next five heats developed various minor defects in the arrangements, but were carried through with encouraging success. The end bricks had by this time washed out and had not yet been replaced by cinder, as was hoped would happen. The cinder on the bottom had also been badly washed away and many of the pipes were exposed to flame. The heating capacity was not sufficient to keep up the temperature under these conditions, and it was also evident that there was not sufficient room for flame development in front of the trunnions. Many of the pipes were also discarded, due to steam pockets.

These pipes were replaced, the whole bottom was lowered six inches to give more room for flame development, and better water connections were added to facilitate the prevention of steam pockets. The ends were lined with tap cinder cast in the dovetails, instead of brick. Stops were also added to prevent the machine oscillating too far in either direction.

The working bottom was made by covering the pipes with broken pieces of tap cinder, and a special pile was placed in the middle which was intended to melt and flow over the rest of the bottom. The cinder was then fused into a mass about 2½ inches thick, but the pile did not entirely melt as the cinder was very refractory. A heat of the same cinder, melted in the auxiliary furnace, was then poured in which smoothed up the bottom.

The first few heats on this bottom worked well, but each successive heat was higher in carbon than the one before, indicating shortness of heat, and the excessive temperature of the cooling water showed that much of it was being lost by absorption, some of the pipes not being sufficiently covered. Although still convinced that the bottom could be made self-repairing, it was determined to use magnesite brick as a foundation for the cinder. The bricks were laid up as tightly as possible, but it was found that they had considerable expansion at the comparatively low heat of the puddling furnace, and humped up badly as the furnace became heated. Molten tap cinder was flowed over the bottom, making it perfectly smooth.

The magnesia brick bottom proved a distinct advance. Several good heats were made, and we began to get reliable data as to the working of the squeezer. No melted tap cinder was added between heats, as it was desired to try to the uttermost the resistance of this bottom to the chemical and physical action of the cinder, and to the abrasion of the puddle ball as it slid over it during massing. The magnesia brick did so well on the bottom that it was determined to use them in the ends and side walls up to the cinder line. Fire brick were put in behind these brick to prevent excessive radiation.

As long as the tap cinder covering remained on the bottom, results were good, but as soon as it wore off in the middle portion the cinder in the joints between the bricks was washed out and replaced by cast iron which became partly refined, to which parts of the later heats stuck fast, necessitating the final removal of the bottom. The temperature of the furnace was higher and more regular.

To try other refractories, a bottom of chrome brick was put in and covered with cinder as before. It could not stand the work and was all washed up on the first heat. Other bricks were tested in the door, such as graphite, carbon, bauxite and amorphous carborundum brick, but none of them stood more than 10 heats.

During these developments in the furnace the squeezer had been doing its work satisfactorily, but it seemed desirable to increase the opportunities for the egress of cinder from the compression box. This was done by doubling the number and size of the slots.

The next bottom put in was of magnesia brick on edge instead of on the flat. As long as the tap cinder remained on the bottom, the results were satisfactory. Trouble began, however, as soon as it was gone. The tap cinder was evidently serving, as does the fettling in the puddling furnace, to form a reservoir upon which the cinder of the heat drew to automatically correct its composition. When it was gone the cinder we were using proved to be too high in silica to properly dephosphorize the metal. This was due to the auxiliary cinder furnace not being able to melt cinders which were

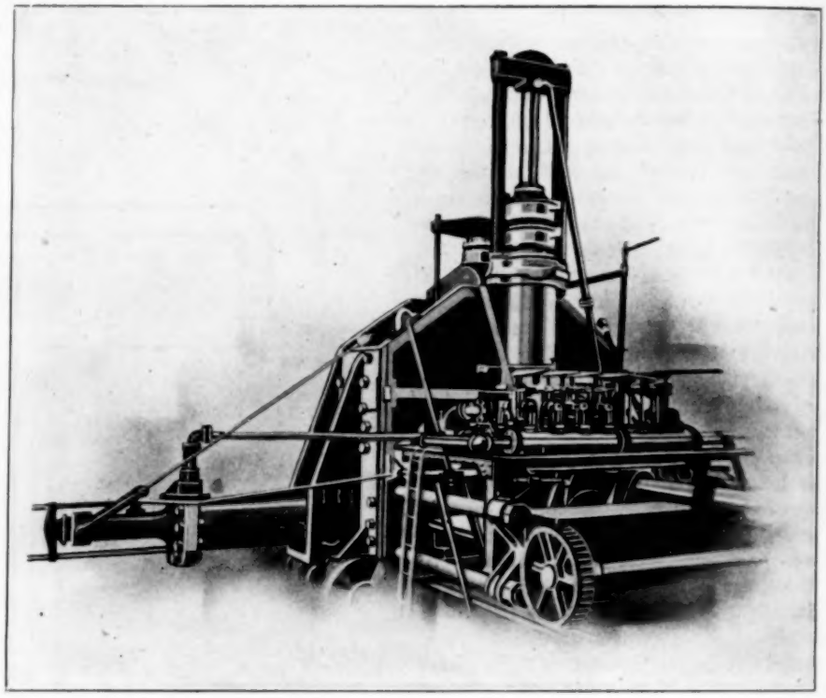


FIG. 5.—SQUEEZER FOR USE WITH ROE PUDDLING PROCESS.

low enough in silica. The expedient was then adopted of bleeding off the cinder immediately after the desiliconizing period, and adding fresh cinder for the dephosphorizing. This proved effective, but occasionally the cinder still remained too high in silica for the most efficient dephosphorization.

As the brick of the bottom became thin in the middle portion, it was found that the cooling pipes did not give them the protection that was hoped for, and the pipes finally again became exposed. At this time the brick retained their original thickness for about one-third of the distance from each end, and it was determined to fill up the central third with tap cinder. This worked well until some of the iron got on the pipes and chilled around the holding straps. On this nucleus a heat finally froze fast and had to be taken out when cold. It was only necessary to renew the middle third in putting in the next bottom, which was done with magnesia bricks as before, except that a mixture of boiled linseed oil and resin was put over the pipes in order to increase the surface of contact with the brick, in the hope of making the cooling action more efficient. The roof was also altered to increase the space for flame development and make the temperature more regular throughout.

The insufficient protection afforded to the brick by the cooling pipes was due largely to the fact of contact being only on narrow lines. The first step, therefore, in the new campaign was to put in another cooling arrangement, composed of double channels, making a pipe of rectangular section. The bottom was lowered as far as the construction permitted, and the roof was raised in the middle which again improved the combustion, making it very satisfactory. Additional escape vents were added to the squeezer by changing the construction of the bottom supports.

The first bottom was made up of magnesia brick for one-third of the furnace length from each end, and the middle section was made of tap cinder. This worked very well, the middle portion wearing down to a certain thickness, where it remained practically constant, cutting down a little during the heat, and building up again from the cinder left behind or added before the next heat. The bottom was used in that form until the certainty of this fact was thoroughly developed.

The tap cinder was then taken out from the middle third, and it was filled in with magnesia brick, as in the remaining two-thirds. Linseed oil and resin was first spread over the channels and the bricks bedded in it. The change in the bottom was made with the idea of seeing whether any useful thickness of cinder could be maintained on top of the brick, and also whether the brick could be used without any protection, beyond that afforded by the cinder incidentally present. The latter fact was not fully developed, but the former was shown to be entirely practicable.

The squeezer, with the minor modifications mentioned, had proved itself to be a thoroughly efficient tool, which removed the cinder uniformly from the mass of iron, leaving no pockets or excess, and delivered the bloom in good shape and of uniform structure.

In practice the most important feature is the production and maintenance, chemically and physically of the proper cinder; the conditions in this case being the same as in the ordinary puddling process, the same kind of cinder is required. It is produced and regulated practically in the same way except that since there is no fettling to act as an automatic regulator, the proper composition must be effected and maintained by direct additions. The cinder which was charged just before the melted iron consisted generally of remelted puddle tap cinder, although iron ore or any other oxide of about the same composition acts equally well. The oxidation of the metalloids is brought about by the addition of roll scale or any other similarly pure oxide of iron.

The dephosphorization is chiefly determined by the amount of silica present in the cinder. It was definitely settled that with 25 per cent of silica in the final cinder the dephosphorization was practically nil, while with 12 per cent of silica in the cinder the phosphorus was reduced to 0.06 per cent in the iron, regardless of the amount originally in the pig, provided that the phosphorus in the cinder did not amount to much over five per cent. The amount of phosphorus in the finished iron can, therefore, be controlled very closely. The thorough elimination of sulphur was also completely established, but it was not settled that it could be as easily and completely controlled as the phosphorus.

All of the heats in this campaign were made with metal direct from the blast furnace, as it was deemed best to thoroughly test the feasibility of doing so. This added to the cost, as in the absence of a mixer, the metal could only be obtained at the time of tapping, which occurred six times in 24 hours. The machine handled with equal facility metal ranging from forge to foundry pig. The operation of the process went along very smoothly, and the iron made was all good, excepting a few heats in which experiments were made with the cinder which did not work out well.

Although no absolute data as to commercial costs could be obtained, and under the conditions of our work, enough were obtained to afford a fair basis for a close estimate as to what they would be in a well-designed plant with continuous running. It can safely be affirmed that they would not exceed those of a well-equipped steel works. It was proved that a clean and effective bottom could only be maintained by having somewhat more than half of it uncovered and exposed to the flame at all times, thus keeping it hot and making the temperature of the bath more uniform, as well as that of the iron after it had come to nature. It was necessary also that the metal should start on its down trips as rapidly and suddenly a possible.

Another feature demonstrated was the practicability of keeping the iron spread loosely and evenly over the bottom after the drop and when it had come to nature, and of retarding or hastening the finishing at will. This was done by the proper manipulation of the oscillations, and made it certain that all of the iron would be uniformly finished, and that there would be no raw iron present when the massing into a ball by impact against the ends was begun.

A gain in weight of about four per cent for the squeezed bloom over the pig iron charged was fully proved. This came in part from iron reduced from the oxide of the cinder and in part from the discharge of the ball into the squeezer as soon as it was made by which the opportunity for surface oxidation while lying in the furnace was entirely eliminated.

The average time of making a heat was 59 minutes, and it was evident that regular working and proper appliances would reduce this time materially. It was also shown that the machine should be made with a capacity of 2½ tons per heat. This would give over 30 tons of blooms per turn of 12 hours. Each machine would require the service of a puddler and two helpers, one of whom would manipulate the oscillations.

The iron is more thoroughly worked than in the ordinary puddling process, and the metalloids can be more completely eliminated. This permits either of starting with inferior pig iron or the production of better material from the same grades, thus widely extending

the range of material entering into the blast furnace, or produced from it. The maxima of the various elements operated upon at different times were: Silicon, 3.5 per cent; phosphorus, three per cent; sulphur, 0.35 per cent; manganese, 2.5 per cent. With all of them good material was obtained. The heats with high silicon were not appreciably longer than the normal, nor were those with high sulphur shorter.

It was also demonstrated that the iron so made could carry a higher percentage of carbon than could that produced in small units, which required to be subsequently welded together. The dimensions of the bloom, as it came from the squeezer, being 12 x 24 x 54 inches, there was ample opportunity for the necessary work in reducing it to the finished size. The bloom being solid and homogeneous from end to end, there was no danger of segregation or of physical imperfections such as piping. It was, therefore, possible to get iron of considerably greater tensile strength longitudinally than is practicable in the ordinary process. The transverse strength, however, still remained materially lower than the longitudinal. The following are given as typical results in the three grades:

C.	P.	S.	Ultimate Strength Lbs.	Elongation per cent	Reduction of Area per cent.	Rolled Sec. Inches.
0.06	0.06	0.009	45,890	30.0	44.4	7-16 x 2 1/4
0.08	0.19	0.009	52,420	30.2	53.6	1 1/4 round.
0.24	0.13	0.007	68,280	19.7	30.9	1/2 x 13

Electric Car Brakes Needed.—Albert Halstead, who succeeded his brother as consul at Birmingham, makes his first report on the practical subject of the American opportunity to sell electric car brakes in Great Britain. He writes:

"While the speed of electric cars in the United Kingdom does not average as high as that of similar cars in the United States, there seems to be a growing danger to passengers on the British street cars by reason of the increasing use of electricity as propelling power. Accidents have occurred lately in the United Kingdom from cars getting beyond the control of the motormen, in the most recent of which three people were killed and a number injured. Authorities who have control of the running of electric cars in the Kingdom are now inclined to insist upon better and more effective brakes for such cars, it being argued that recent accidents would have been averted had the cars been supplied with suitable brakes. It would seem as if this attention to the question of proper brakes on electric cars should offer an immediate opportunity for American manufacturers of electric car brakes of all standard kinds to push their sales in the United Kingdom."

CAST IRON VS. CAST STEEL FOR GEARS.

The accompanying illustrations show the immense advantage cast steel possesses over cast iron in gears. The

FIG. 1.—FRONT OF CAST STEEL BEVEL GEAR.

two illustrations are photographs of the front and back, respectively, of a cast steel gear, which had been in service on the table of a rolling mill for a period of about one year. The front of the gear gives an idea of the original section of the teeth, while the back view shows how greatly they were worn. The gear was still in service and could have run some time longer, but it was taken out in its present condition, on account of the mill being closed down for general

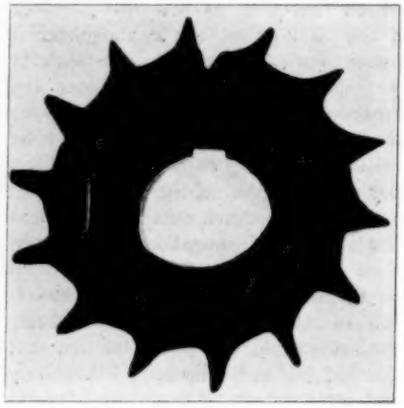


FIG. 2.—BACK OF CAST STEEL BEVEL GEAR.

repairs. While badly worn, and while all semblance to the original tooth had disappeared, it was still capable of driving the mill. A cast iron gear would have broken off long before it had worn to anywhere near the shape shown by these illustrations.

CARGO SAMPLING OF IRON ORE AT ERIE PORTS.

BY JOHN C. POWERS

A subject of the importance of ore sampling to buyers and sellers deserves more attention than it has received. It would receive more if the carelessness and dishonesty of the sampler's work were better known. It seems incredible that the brokers and furnaces give so little heed to the operation that means dollars and cents to them. An error of one per cent in the iron analysis of a cargo, is a serious matter if the ore is guaranteed to run a certain amount, and means the loss of many dollars.

The half dozen firms of chemists who act as umpires between the buyers and sellers determine the price at which the cargo is to be sold and upon the men who take the sample depends the fairness of the result.

With the exception of a few of these firms, their object seems to be not "how fair," but "how cheap." In many instances boys or ignorant men who are willing to accept small wages are employed; and at a distant port—away from all restraining influences—they very naturally do their work in the easiest possible manner.

It is not unusual, in these days of rapid unloading, for a sampler to reach his boat when the cargo is nearly discharged; but, so long as there is a can full left, that is all that is necessary, and dropping to the hold this is scraped up and sent to the laboratory as a fair sample of the cargo, and upon its analysis is the worth of the ore determined.

Examples of downright dishonesty are not quite so common, but are by no means rare. In Ashtabula, not so very many years ago, a certain sampler found upon his list two cargoes of Stevenson—one at the Minnesota dock, the other at Conneaut. His expenses to Conneaut would amount to a dollar or more and, wishing to put this into his own pocket to eke out a salary pitifully low, he filled two bags from the Ashtabula cargo, and sent one in as representing the Conneaut boat. At this time Stevenson was varying widely in quality, but as the two samples checked, there was absolutely no question about the matter. How often this performance was repeated and perhaps copied by his brother samplers, no one knows.

Of course ignorance, inexperience and wrong method are to blame for the greatest number of unreliable results. All firms break in new men in the same manner—a few days' work with an experienced sampler is deemed sufficient. Perhaps, and very likely, all the ore sampled during this time is soft, and when

the new man meets a cargo of hard ore he selects broken pieces and chips, thinking he has a fair sample and not realizing there would be more pieces broken from the softer and more brittle lumps—and anyway it's easier. No two firms use the same method. One directs his men to take a trowel full here, a measured distance above another, and so on covering the entire cargo. This is good—or was before the days of "grab buckets" and scrapers. Of necessity the sampler must work while the unloading is in progress and if he values his head—and he does—he must dodge the buckets and take his sample where he may. Another firm takes a trowel full here and when a lump is encountered a piece measuring one cubic inch is to be added to the collection. And so it goes—all different, but all arbitrary. Nothing is left to the sampler's judgment—a man with no judgment will do. And yet with man-carrying Huletts gliding into the hold or Hoover & Masons dropping with a clang, these arbitrary rules are worthless and on the man and the man alone depends a fair result.

The brokers have taken a few steps towards better sampling. In Cleveland, the home of both broker and chemist, a representative of the broker's office sometimes happens down on the dock, and from the security of the deck wisely watches the sampler crawling over the ore piles below. This has one result; it makes the sampler a trifle careful about getting around in good season. At out-of-town ports, the recently inaugurated custom of requiring the sampler to report to the dock boss serves the same purpose—sometimes. In a small town where time hangs heavy on the hands of dock boss and sampler, an acquaintance is sure to be struck up, and the boss finds it easier to ask the sampler when he sampled than to watch and find out for himself. Of course, there are plenty of honest men, but at $50 a month they are scarce.

The broker watches more than the buyer, and is dissatisfied with results more often; hence the sampler is very apt to take the path of least resistance and obtain results higher than he should. At least one chemist instructs his men—or rather boys—to "favor their samples." The chances are that of several chemists on a cargo the lowest result is the most accurate. For this reason it behooves the furnace to watch the sampling as well as the broker.

The prime remedy is, of course, good men. By good is meant not only honest and reliable but competent as well. There is a knack to fair sampling that all men do not possess. During a rush last season a certain assistant chemist was sent to the docks. He attempted some Clifford—not easy of sampling—and obtained a result most wonderful. He met with the same success on several of the softer ores and was finally withdrawn although he had tried his hardest, and followed directions most implicitly. Nearly everything depends upon the judgment of the sampler, upon his getting the correct proportion of good lump and bad; and of lump and fine. A lump should be broken across and not with the cleavage. A piece should be taken equal in weight to the weight of fine; but above all the sample should be large, thoroughly mixed and then quartered to the canful.

To insure a proper attention to their duties, an inspector of samplers should be employed by the chemist, furnace, or broker, who while known to be absolutely reliable, should be a practical sampler of broad experience. His duties should consist of traveling from port to port, and boat to boat to criticize and instruct the men, and by the very uncertainty of the time of his appearance hold them to their duty.

CANADIAN NEWS NOTES.

The Dominion Iron & Steel Co., of Sydney, N. S., has commenced the preliminary work in connection with the installation of two Bessemer steel converters, which it is expected will be in operation within two months.

The Farrar Transportation Co., of Collingwood, Ont., has closed a contract with the Collingwood Ship Building Co. for the construction of a large steel freight steamer of the arch system type. The size will be 406 feet long, 50 feet beam and 28 feet deep.

At a meeting of the shareholders of the Grand Trunk Pacific Railway Co., held in Montreal, July 31, it was decided to spend at least $15,000,000 on the construction of rolling stock. The necessary funds will be raised by the issue of debenture stock at four per cent interest as required.

W. W. Murray, who holds a controlling interest in the Majestic Wire Fencing Co., Mich., is in Winnipeg in connection with the establishment of wire factories in that city and in Edmonton, Alberta. These enterprises are undertaken by Mr. Murray individually and not in connection with the Majestic company. At the Winnipeg factory he will make wire fabric for concrete reinforcement in addition to wire fencing, etc., and expects to give employment to 100 men this fall.

W. A. Cockburn, of Sturgeon Falls, Ont., has discovered an iron ore deposit, consisting of a vein 25 feet wide in Kirkpatrick township, two miles south of Verner station, on the Canadian Pacific railway.

MACHINE TOOLS FOR MEXICO.

Consul Wm. W. Canada reports as follows from Veracruz on the industries in that region using machine tools:

"In the state of Veracruz there are a number of large cotton mills, a jute mill, a petroleum refinery, several breweries, soap, cigar and cigarette factories, alcohol distilleries (cane), flour mills, candle and match factories, brickyards, tanneries, a wire nail works, several small oil mills, also a few furniture factories that hardly merit the name. In the states of Tabasco and Chiapas nothing much is done in these lines. Small repair shops and foundries are established at various points along the coast and in the interior, but a fair-sized piece of work can only be done at the government arsenal at this port, or at one of the railway repair shops. The four lines that have their termini at this point have repair shops at the following places: The Mexican railway at Orizaba and at Veracruz; the Interoceanic railway at Jalapa; the Veracruz & Pacific railroad at Tierra Blanca, and the Alvarado railroad at Alvarado; all in this state. The National railway of Tehuantepec also has extensive machine shops, as they are engaged in reconstructing the road and constructing the harbor works at Coatzacoalcos, on the gulf, and at Salina Cruz, on the Pacific. The petroleum works at Veracruz operate a good machine shop, for the repairs of engines, steam pumps, and can-making machinery, in connection with their establishment. Outside of this there is a foundry and several small machine shops here. At Frontera, in the state of Tabasco, repairs can be made to small vessels and machinery."

Mr. Canada gives the names of the principal importers of all kinds of machinery at Veracruz, which can be secured from the Bureau of Manufactures, Washington.

WATER FOR YOUNGSTOWN.

James A. Campbell, president and general manager of the Youngstown Sheet & Tube Co., Thomas McDonald, general superintendent of the Ohio works of the Carnegie Steel Co., and Frank Hitchcock, manager of the Hubbard furnaces of the Andrews & Hitchcock Iron Co., appeared before the trustees of the Youngstown Chamber of Commerce recently and urged the necessity of a more adequate water supply for the rolling mills, steel plants and furnaces in that district. The present supply is so far from being ample, it was pointed out, that the industrial growth of Youngstown and vicinity will be immediately checked unless relief measures are taken at once.

THE INFLUENCE OF SILICON AND GRAPHITE ON THE OPEN-HEARTH PROCESS.[1]

BY ALEX S. THOMAS.

However good a furnace may be in regard to design, etc., or however excellent in the quality of the gas used, a suitable heat for the successful working of the metal cannot be obtained unless the melt be coated by a proper quantity of slag. This coating may be excessive or it may be deficient in quantity. The right degree of heat is the essential condition of successful working, for the quality of the steel made is never very good when the metal is allowed to simmer in the furnace for an excessive period, and this heat cannot be obtained if the metal is not protected by a proper covering of slag. This is not only to prevent the metal being over-oxidised and wasted, but also to prevent the metal being chilled when exposed with only a thin covering of slag.

The slag may be obtained by either of two ways: firstly, naturally, by the presence of sufficient silicon in the iron used to unite with oxide of iron to form a staple slag; or, secondly, by the addition of slag or free silica. In the first case the slag is formed naturally by the action of the oxygen in the flame—i. e., the oxidizing atmosphere of the furnace—on the silicon in the metal when melting. The charge then melts, as it is termed, "thick," and protects the banks from being cut.

If too much silicon be present, however, and an excessive quantity of slag be formed, it will be found to be rather infusible, and unless care be taken to add the oxides quickly and follow the furnace up—thus rendering the slag more fusible by the extra oxide of iron—the furnace bottom is liable to be pulled up. In such cases the author has frequently been able to warn a furnaceman that unless he got his slag thinner and less viscous the bottom would be "up," although no signs of such a bad bottom could be seen at the time. Another disadvantage of too high a percentage of silicon is that the metal is liable to become too hot and froth up through the slag, becoming exposed to the oxidizing atmosphere of the furnace. The metal will then be burnt and carried over into the checkers as oxide (Fe_2O_3), which will be found in a fine state of division in the flues.

[1]A paper presented at the London, (July, 1906) meeting of the Iron and Steel Institute.

Provided the right percentage of silicon is secured in the iron to form a suitable slag, naturally, the furnaceman can work the cast much quicker, because of the greater initial heat enabling him to add his oxides faster and so oxidize his metalloids, with an increased yield and a saving of one to two hours per charge.

Where low silicon pig is used (by low silicon pig is meant silicon under 1.25 per cent), free silica or slag may be added to the charge to form a slag or coating to protect the metal. A certain amount of heat is taken up in melting this, and owing to the character of the iron (low silicon), oxide of iron is formed freely. However careful the operator may be, this cannot always be brought, as soon as made, into intimate contact with the free silica or slag added, so that the banks are fluxed and much damage is done to the furnace, with delay for repairs. There is also the probability of the charge breaking out. Of course, in a badly constructed furnace, or when the gas is of poor quality, causing slow melting of the charge, a greater quantity of oxide of iron is formed even with a high silicon pig, and the banks of furnaces will be fluxed, as the ferrous oxide will more readily enter into combination with the free silica from the banks of the furnace than from the silicon in the iron, owing to the low temperature of the bath.

But, given a good furnace, all the essential constituents that go towards the successful working and making of acid open-hearth steel and a low silicon iron, it will be found that the charge is often boiling before it is quite melted; for the little silicon that is present is quickly oxidized out, and the oxide of iron unites with the free silica of the banks and fluxes them badly, principally on the slag line. The damage to the banks is therefore done before the charge is in condition to receive the iron ore or other oxides to oxidize the remaining metalloids, or to receive the benefit of the silica in the ore, which might have entered into combination with the oxide of iron to form a stable slag and so have protected the banks.

The author has always found that where low silicon pig is used a great loss of iron takes place, not only by oxidation through exposure to the flame of the furnace, but also by the loss of iron in the oxides owing to the smaller quantity of oxides which are used. Again, there is never the same vigorous action in the furnace when low silicon pig is used, owing to the lower initial heat in the charge when molten. A loss of fuel is also attributable to loss of heat by the scanty slag being unable to retain the heat of the metal, as the metal readily chills when unprotected by a good siliceous slag.

The argument is put forward by some iron manufacturers that, with the smaller percentage of silicon, the steelmaker gains, in a corresponding degree a greater percentage of iron in the pig iron. This may appear to be so on the surface, but supposing 25 tons of pig iron be charged in a 40-ton charge, a difference of even one per cent of silicon means 500 pounds of iron, and far more than this is oxidized and wasted, not to mention the extra time taken in working the cast, and the delay in repairing the furnace banks.

Again, a 40-ton furnace charging cold material will make 3½ tons of steel per hour, so that if a charge of low silicon pig takes one to two hours per charge longer, it means that 3½ to 7 tons less steel are made, with a consequent rise in the cost of fuel, labor, etc., per ton of steel actually produced.

Regarding the making of a slag artificially, the author believes this to be necessary only in the manufacture of high grade steel, where the time taken to work a cast is not of much moment and the yields are never thought of. In this case an extra quantity of slag would reduce the rapid oxidation, and aid in the production of high carbon steels. It would also eliminate any tendency of the metal to become "wild" by reducing the amount of active oxide in the slag. For the ordinary grade of steels a large output and a good yield is only obtained by having enough silicon in the iron to form a natural coating—neither scanty nor excessive—but just sufficient to allow of the rapid addition of oxides and oxidation of the metalloids.

The author's experience of high silicon and low silicon pig is that, when using pig with silicon of 2 per cent and over, the banks are seldom, if ever, fluxed; but that bad bottoms very often occur if the furnaceman lags behind, and does not add his oxides quickly enough to keep his slag from becoming viscous. When using low silicon pig (1 per cent and under) the banks are invariably fluxed, but the bottom of the furnace very seldom comes up. Therefore, in the acid open-hearth process, a middle course must be steered by using an iron with the silicon neither very high nor yet very low, and the author's experience is that a silicon containing from 1.25 per cent to 2 per cent is an ideal one for the acid open-hearth melter.

There is no doubt that the up-to-date iron manufacturer is handicapped when

making high silicon iron (above 1¼ per cent), and the acid steel maker is also handicapped when using iron under 1.25 per cent. To bring the steel maker into line with the iron maker, the author would suggest that in furnaces making acid steel with low silicon iron the acid bottoms now used should be replaced by basic bottoms, and the low silicon hematite iron worked on the basic bottom.

This could not be called a basic process the essential aim and feature of the basic process (dephosphorization) being absent, and only enough lime (3 to 5 per cent) need be added to render the slag just sufficiently basic to prevent the banks and bottoms being fluxed. It would be an acid process on a basic bottom, and the quality of the resulting steel would be superior to the average quality made on acid bottoms. The output would also be increased 15 to 20 per cent, as so much more steel scrap could then be used in the charge.

While numerous papers have been read at various times on the effect of low and high silicon, etc., in the retarding or otherwise of the process of refining iron by the open-hearth process, a very important constituent in the iron, viz., carbon in the graphite form, does not seem to have met with the attention which it really deserves.

Mr. Talbot has given the metallurgical world one of the most interesting processes of recent years, and one in which the various reactions can be better perceived and studied than in the ordinary process of first melting and then decarburizing, etc., by slow degrees.

In a 160-ton furnace where hematite iron is used, silicon—contrary to one's expectation—is not a trouble to the same extent as graphite. The fluxing effect of the silicon on the banks of the furnace is easily neutralized by the addition of lime, provided the approximate percentage of silicon in the iron be known; and although no mixer be used and the iron be obtained from one blast-furnace, the silicon does not vary very much, although the graphite does, and it is this graphite which retards the process of steel making—more so even than phosphorus or high silicon would.

Generally, however, a high percentage of silicon in the iron is accompanied by a high percentage of graphite, and therefore high silicon is a disadvantage only because it is accompanied by a separation of the carbon in the graphite form.

When a charge of iron containing a high percentage of graphite is worked, the whole bath in the furnace is covered with a layer of "kish," and the sand shovels can be put into the furnace and the carbon actually ladled off the surface of the bath. When the iron is of this nature, the whole bath lies dormant until the carbon is partly burnt off and partly converted into the combined state. As soon as this takes place the bath becomes active again. Whilst the bath is lying inactive it means so much time lost and greater consumption of fuel, etc., as the furnace charge is practically at a standstill, sometimes as long as two hours. The addition of oxides or even a vigorous mechanical agitation of the bath does not in the least affect this state of affairs, and it is necessary to wait until the graphite is partly burnt off and partly converted into the combined form. When the percentage of graphite is low none of the above disadvantages are met with, as the metalloids in the iron and the oxides in the bath gently react without cessation, and no delay takes place. Further—whereas the average time taken in pouring a ladle of low graphite iron into the furnace is only about thirty minutes—it takes one and a half to two hours to pour in an equal quantity of high graphite iron, owing to the very violent reactions which take place. The operation of pouring iron into the highly oxidized bath may be steadily proceeded with in the case of iron containing carbon in the combined form and low graphitic contents, as a steady reaction between oxides and metalloids takes place throughout the whole operation and until the carbon reaches the required percentage.

When the carbon in the iron is high in graphite, no reaction takes place for some time, so that only three to five tons are poured in at a time, because when the reaction does take place, from ten to thirty minutes afterwards, it is so sudden and violent that slag and oftimes metal, are thrown out of the doors, and the reaction is so great that the flame sometimes reaches across the stage and up to the roof of the shop, causing great pressure in the furnace. Of course, when this happens, gas and air are shut off until the reaction subsides. A few tons more iron are then poured in, and usually another long wait ensues until the oxides and metalloids react. It is this waiting, interrupting the continuity of the process, lowering the output, and causing wear and tear of the furnace and a higher consumption of fuel, etc., which renders the presence of graphite objectionable.

Usually after emptying the ladle of high graphitic iron, the longest spell of inactivity takes place, due most likely to the lower temperature of the bath, the more feeble oxidizing power of the slag, and the presence of a greater quantity of graphite, which, floating on the top of the molten iron, is unavoidably poured in with the last lot of iron in the ladle. This spell of inactivity may last as long as one to one and a half hours before the bath begins to boil. All this tends to show that free carbon in iron has a very marked effect in retarding the process, although far less attention has been paid to the effects of graphite than their importance demands.

The author has found that when iron with a high percentage of combined carbon was supplied, instead of highly graphitic iron, the output was immediately increased 25 per cent and the wear and tear on the furnace was reduced 100 per cent. These figures speak for themselves. The intermediate process between the above "all molten" and the ordinary process of charging all cold materials was used for a few years, but it has been discontinued, as the desired advantage was not obtained, because the iron had to be brought direct from the blast-furnace, and it was therefore impossible to get it just at the proper time to suit the steel furnaces. At the acid open-hearth furnaces 28 tons of cold material were charged, and when this was about melted 10 to 12 tons of molten iron were added. If the percentage of silicon was not too low, and the iron not too high in graphite, there was usually an hour gained on an average per charge over the ordinary process of cold charging; but when the iron was high in graphite, time was lost in decarburizing, and instead of gaining an hour, an hour would be lost over the ordinary process. The foregoing applies to the effect of graphite when using molten iron. But does not the same condition of affairs exist in the ordinary process of charging cold material? When using pig iron containing a high percentage of silicon, is not the longer time taken in working such a charge—generally attributed to the high percentage of silicon—really due to the high percentage of graphite present? Why do some charges, using equal quantities of iron, with the same percentages of silicon, and practically the same percentages of total carbon, take so much longer to decarburize than others, under similar working conditions of heat, etc.? During the period of melting the percentage of carbon when in the combined form is greatly reduced by being partly oxidized in the oxidizing atmosphere in the furnace, but when carbon is present mostly in the graphitic state, this reduction does not take place as the carbon is being converted into the combined form, so that when the charge is melted a greater percentage of carbon is present to be decarburized by the oxides added. When using high graphitic iron, the author finds that less than 10 per cent of the estimated carbon contents are eliminated during the melting period. This differs greatly from the 30 to 45 per cent given by Harbord and Campbell in their books.

A FOUNDRY SAND MIXER.

Every year sees more labor-saving appliances introduced into all branches of work, but up to the present time the sand heaps in the foundry have always been cut over by hand. Foundrymen have realized that this was a slow and costly method, but the general foundry conditions have thus far prevented the introduction of machinery for this purpose. At last, however, an inventor has turned his attention to this subject and solved the problem, the result being the Stockham mixer shown in the accompanying illustrations and manufactured by the Stockham Homogeneous Mixer Mfg. Co., of Piqua, O.

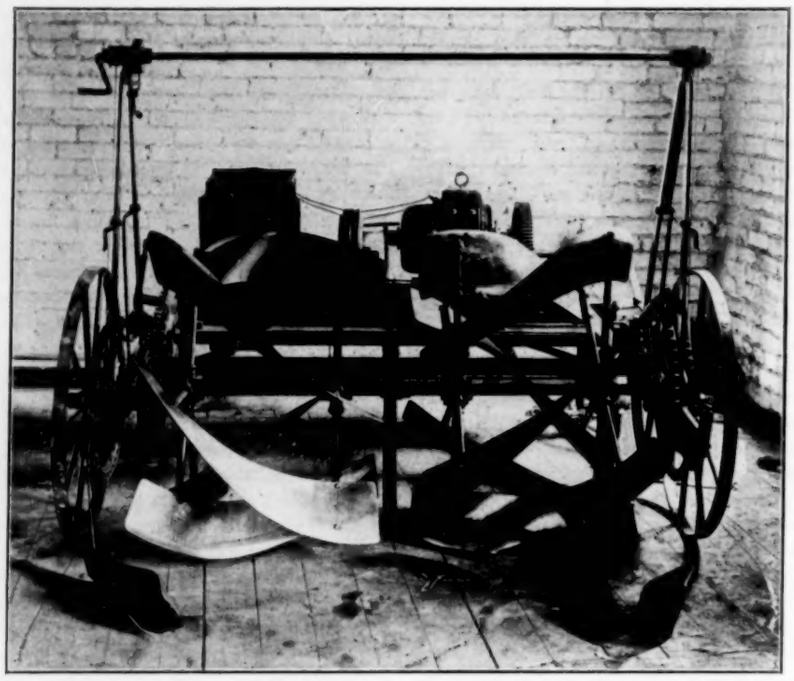


FIG. 1.—STOCKHAM SAND MIXER. KNIVES DOWN AND READY FOR USE.

This machine is patented in both the United States and foreign countries and is now ready for the market. It is self-propelling and may be driven by electricity or any other suitable motive power. When in operation the large or driving wheels advance the machine at such a rate that the rapidly rotating knives pass through the sand heap at intervals of one-half inch. The knives cut down through the heap and then throw the sand to the rear. The curved form of the knife blades is such that the sand is thrown up in a ridge behind the machine, just as it would be in the old mixing process and the fact that each knife cuts from the top to the bottom of the pile and then distributes this amount of sand evenly over the pile results in very thorough mixing. It also makes it possible to introduce new molding sand, facing material, or anything of the kind, by simply distributing it evenly over the top of the pile before the machine is sent through it. The machine is followed by a pair of scrapers which serve to trim up the bottom of the pile and leave it neat. The parts are made strong enough so that nails or gaggers in the sand will not injure the machine, while an automatic cut-out is arranged which instantly stops the machine if the blades strike any hard substance offering resistance, such as a clamp, gate or casting. It is claimed that under favorable conditions one of these machines can cut up 100 heaps of sand, each 60 feet long, in ten hours. The machine complete weighs 650 pounds and can be operated with either direct or alternating current at any standard voltage. The machine can also be used for cutting up core sand by spreading the various ingredients one on top of the other in a heap and then sending the machine along the heap. The mixing will be very much more thorough than that accomplished by hand shoveling. It is said that a machine of this kind can mix core sand or facing sand at the rate of ten tons per hour. When not in use, or when being moved from one place to another, the revolving blades are swung up clear of the floor, as shown in one of the illustrations.

FIG. 2.—STOCKHAM SAND MIXER. KNIVES RAISED FOR TRANSPORTATION ABOUT THE SHOP.

The Crocker-Wheeler Co. has opened an office at 447 Pacific Electric building, Los Angeles, Cal., with L. Cummins as representative. An office and warehouse have been opened at 208 First street, near Howard, San Francisco, Cal., with H. C. Baker in charge. A Seattle, Wash., office will shortly be opened.

RECORD OF SUCCESS

Is That of the Six Vermillion Range Mines.—Methods Employed.

(Staff Correspondence.)

Office of THE IRON TRADE REVIEW. Duluth, August 6.

To mine and bring to the surface from a depth of 1,000 feet 24,000,000 tons of ore, most of which had to be loosened with pick and powder, is no small undertaking. This, however, has been the record of the six mines of the Vermillion range consisting of the Soudan mine near Tower, and the Chandler, Pioneer, Zenith, Sibley and Savoy mines twenty-five miles away on the bank of Shagawa Lake at Ely, Minn. The history of these mines is the history of the discovery of iron ore in Minnesota, the early struggle to obtain capital for the development and transportation of the ore and the strange beginnings which have resulted in the largest and most economically operated underground iron mines in the world.

The ore body of the Chandler and Pioneer mines is continuous, but is separated from the workings of the Zenith by a wall of rock. There is also but the one ore body for the Sibley and Savoy mines and underground passages connect the two shafts. This range is the headquarters of Charles Trezona, superintendent, who has working with him in charge of the Chandler and Pioneer mines Charles Grabowsky and in charge of the Zenith, Sibley and Savoy, Capt. Nick Cowling. The ore from the Vermillion is of two general grades, a fine ore and lump. With the exception of the Soudan which mines only hard ore, both grades come from each of the other mines and are known as Chandler and Chandler lump, Pioneer and Pilot (Pilot being Pioneer lump), Zenith and Zenith lump, Sibley and Sibley lump, Savoy and Savoy lump. The Savoy also ships a grade of ore called Jura which is a soft ore separated because of constituent qualities. The ore is enclosed in fissures and pockets that run deep, confined between walls of paint rock and buried under deposits of green rock through which the shafts must be sunk and the levels drifted. In the Pioneer mine the head wall is a cap rock formation of green rock slanting so that the extent of the ore body is increasing with the depth of the working level.

The "Caving" System.

The method of mining which has been developed here is not unique in the main being a type of the "caving" system, which is particularly adapted to the nature of Vermillion ore. In the Pioneer mine the shaft is about 1,100 feet deep and there are three active levels, at present, number ten, eleven and twelve. All the tramming is done on level eleven as it was formerly on number ten and before that in the earlier days of the mine on number nine, which is now completely caved in. Nothing is left of the levels that have been worked out save the opening at the shaft, the drifts having been entirely caved in, which is also beginning to be the condition of level ten. Where it is still required to keep a passage open, the old timbers have had to be cut out and replaced with new ones and the fallen rock carted out. Level twelve is used as a drainage level for the mine and has not been opened out save in the principal drifts and there are no sub-levels between eleven and twelve. In twelve, gutters and pipes drain the water down to a well near the bottom of the old shaft from which the water is raised all the way to the surface by one pump. This pump is of the crank and flywheel type with Corliss engine steam end and especially constructed Prescott water ends adapted to suit. The mine is equipped elsewhere with smaller Prescott and Cameron pumps for emergencies.

Just now the main passage way on level twelve connects the bottoms of the old and new shafts and the main drifts have been carried through the green rock to the face of the ore body, but ore is being mined only between ten and eleven, where the ore is honeycombed with passages leaving pillars about twenty-five feet square. Of course, the ore between level ten and the first sub-level above cannot be mined until the ore is being worked out through level eleven and that is also being taken out now.

A Large Operation.

The tramming of the ore on level eleven is a large operation. The level is lighted throughout by electricity and tracks are laid to every raise. Steel hopper cars are used and they are pulled about by electric motors built by the Goodman Mfg. Co., the motors being simply enclosed in a close fitting steel casing and mounted on a low truck. At the shaft is a steel track hopper with its spouts leading into the skip and with a capacity ample to prevent stoppage of both cars and hoist when delays occur in the operation of either. The ore is carried to the surface at the rate of a thousand feet a minute at the Pioneer mine and in the head frame the soft ore is separated from the hard. The head frames at shafts number two of both the Pioneer and Zenith mines are of steel, built of angle iron and bars, as are also the head frames of the Sibley and Savoy mines. All the others are of wood, the steel frames having been erected within the past two or three years. The steel head frames of the Pioneer, Sibley and Savoy mines are all 160 feet high and that of the Zenith shaft 90 feet. In all of them the principle of separation is the same, the ore being dumped from the skip onto a set of inclined bars placed over hoppers, though several arrangements of the bars are to be seen. In the high frames which were built so tall just to permit it, the bars are long and slant only in one direction. In the lower frames the bars are shorter and arranged like a roof, shedding the ore to either side, which method has been found to work as well as the other.

The power equipment of this group of mines consists of six separate power houses and six boiler plants. The hoists are of two general types. At the Chandler and Zenith number two shafts, the hoists are eight-foot drums driven by a large spur gear and pinion from Corliss engines. These plants have two engines and two hoists, each working independently and developing about 750 horsepower apiece. At the Pioneer number one there are three hoisting engines, two working together for the skip hoists and developing between 1,500 and 2,000 horsepower and the third being used for the man hoist. The plant also includes an Ideal engine, belt connected to a General Electric generator developing 400 amperes at 250 volts and 550 revolutions. This current is used for the lighting and tramming in both the Chandler and Pioneer mines. The Pioneer number two hoists are 12-foot drums driven directly by two engines having Corliss valve gear and built by the Sullivan Machinery Co. The Zenith number one shaft has but one engine, a Reynolds-Corliss of about 400 horsepower. Each of these power stations has its own boiler plant. Most of the boilers are of the return tubular type though there is an upright Cahall at the old Pioneer shaft. Their capacity ranges from 100 horsepower for the old ones to 200 horsepower for the later installations. The boiler house at the Zenith number one shaft is soon to be done away with and the steam obtained from the better equipped boiler house at the other shaft. The steam piping, which will be several hundred feet long and brought across on top of wooden pillars, has been recently completed.

The Best Equipped Plant.

The plant for the Sibley and Savoy mines is by far the best equipped, the one plant operating both mines, which means an unusual length for the hoisting cables of the Savoy, as the plant

is along side of the Sibley. The hoisting drums are twelve feet in diameter and the engines are Sullivan-Corliss, driving the hoists directly as in all the later arrangements. In addition there is an Ingersoll-Sargeant tandem compound air compressor the old steam ends of which have been replaced by Allis-Chalmers cylinders and valve gear and which is run condensing, water being piped from the lake close by. A 178-horsepower McEwen engine, built by the Ridgway Dynamo & Engine Co., drives a 250-volt General Electric direct current generator of 250 545 amperes capacity at 275 revolutions. This supplies light and power not only for the Sibley and Savoy but also for the Zenith. An Ingersoll-Sergeant air pump is driven from the air compressor and is of the walking beam type. As in the Chandler mine, the Webster heating system is used here, with Webster feed water heaters and Prescott pumps. The boiler plant consists of four return tubular boilers of 200 horsepower each built by the Northwestern Steam Boiler & Mfg. Co., of Duluth, by which most of the other boilers were also furnished.

Each of the mines has its own "dry" for the miners' convenience and at the Pioneer there is a machine shop and blacksmith shop where most of the repairs for the group of mines are made. The steel shaft of the Pioneer mine is sunk through solid rock and is built of steel rails bound together by angles and there is none of the timbering along the sides necessary in the other or wooden shafts. This shaft is inclined as is the wooden shaft of the Savoy. The others are vertical. The shafts are either three or four compartment. Two compartments are for the skips, one going up while the other goes down and the third compartment is for the man hoist. A fourth compartment in some of the shafts is used for piping. In the Pioneer No. 1 the man cage is placed on top of the skip and there are safety devices which automatically prevent the skip running away. All of the engines as well are provided with automatic controls. Separate signals indicate whether a man or a skip is to be hauled up so that the greatest precautions for safety are taken.

The mines on the Vermillion will produce this year close to a million and three-quarters tons of ore, which is a small increase over last year. The stock piles which were accumulated during the winter to the extent of about three-quarters of a million tons are being shipped from, along with the ore from the mines and are rapidly being diminished.

NEW SHOPS AND POWER PLANT AT HIBBING, MINN.

Built of steel and enclosed with galvanized iron, in a style that has become distinctive of its newer power and shaft houses all over the range, the Oliver Iron Mining Co. has erected and equipped an excellent plant at Hibbing, Minn. The shops have been in operation about a year and already have been found too small for the needs of this district. The main building is about 50 feet by 150 feet and provides for a carpenter shop in front, a blacksmith shop and a machine shop. The front part of the building has only one bay, but the machine shop is divided into two longitudinal bays to provide for the installation of a Pawling & Harnischfeger crane on one side for handling heavy locomotive parts that come in for repair.

The blacksmith shop is equipped with two Buffalo Forge Co.'s forges, a steam hammer built by Bement, Miles & Co., and a Long & Allstatter punch for structural work. The machine shop presents quite a variety of tools supplied by the Robinson & Carey Co., of St. Paul, including two LeBlond lathes, Bickford drill, lathes and planer by the Pond Machine Tool Co., Hurlburt & Rogers bolt cutter, pipe threading machines from Bignall & Keeler, drill from the American Tool Works and a shaper from the Cincinnati Shaper Co. The work is largely repair work on locomotives, hoisting engines and mine apparatus, but the volume of it and the urgency of almost every job necessitates and justifies the considerable outlay.

The power plant is situated at the rear of the machine shop and looks out over the property which is being stripped to make the open pit Sellers mine. Here a 150-horsepower Reynolds-Corliss engine is installed which drives by means of a countershaft a Westinghouse alternating current generator developing 100 kilowatts at 250 volts with a terminal current of 231 amperes. The machine is three-phase running at 600 revolutions with 7,200 alternations.

Mounted on a bracket outside of the outboard bearing of this machine and driven from the same shaft is a 4-kilowatt, 125-volt Westinghouse direct current generator. An Ingersoll-Sergeant air compressor is now furnishing air not only for the penumatic tools but for the forge blast in the blacksmith shop. This is requiring far more from the machine than its capacity warrants and at present it is running at a speed that will test its qualities of endurance. It is one of that type with twin steam ends and compound air ends and has been carrying the overload very successfully. The boiler plant consists of three 150-horsepower boilers built by the Northwestern Steam Boiler Works of Duluth. Two Prescott pumps are doing service, one as a circulation pump for the Webster heating system and one as feed pump.

FAILURE IN CANADA.

Free Alcohol Little Used for Fuel and Lighting in the Dominion.

(Staff Correspondence.)

Toronto, Can., Aug. 13.—The widespread discussion of the question of free alcohol for industrial uses in the United States has called the attention of Canadian manufacturers to the importance of obtaining a cheap supply of alcohol here. Canada already has free alcohol, as no duty has been levied on that used for manufacturing purposes since 1889, but it has not been cheapened to such an extent that it can be generally used as a fuel and an illuminant.

For some time the inland revenue department has purchased alcohol from the distillers at about 49 cents per gallon. It is denatured and rendered unfit for use as a beverage by an admixture of wood alcohol purchased under contract from the manufacturers, the present price being $1.29 per gallon. The mixture known as "methylated spirits" has been sold by the department, with certain restrictions as to its use, at $1.10 per gallon for No. 1 and $1.50 for No. 2 grade. These prices are largely prohibitive despite the absence of any duty and the problem which presents itself is how the figure can be reduced so that it can successfully compete with coal oil or gasoline.

To this question the inland revenue department is devoting a good deal of attention. In the evidence taken before the congressional committee at Washington it was shown that alcohol can be made in some parts of the United States at a cost under 25 cents per gallon, and it is urged that there is no good reason for believing that it cannot be produced equally cheap in Canada. As an initial step the department has cut the price from the figures previously specified to 90c and $1.25 per gallon, commencing August 1. Experiments are being carried out in the laboratory of the department, with a view of securing a more economical denaturing mixture than that now employed.

The Pressed Steel Car Co. has declared its regular quarterly dividend of 1¾ per cent on the preferred stock.

MIDSUMMER STATISTICS FOR CANADA.

The American Iron & Steel Association has received direct from the manufacturers the statistics of the production of pig iron in Canada in the first six months of 1906. The figures show a large increase as compared with either of the two halves of 1905.

Total Production.—The production in the first half of 1906 amounted to 282,010 tons, against 257,797 tons in the last half of 1905 and 210,206 tons in the first half of that year. The production in the first six months of 1906 was the greatest in any half year in the history of the Dominion, exceeding by 24,213 tons that of the last half of 1905, the next highest half year. It was also greater than the production of any whole year prior to 1902.

Bessemer and Basic Pig Iron.—The production of Bessemer pig iron in the first half of 1906 amounted to 79,051 tons, against 85,418 tons in the last half of 1905, a decrease of 6,367 tons. In the first half of 1905 the production was 63,785 tons. The production of basic pig iron in the first half of 1906 amounted to 135,298 tons, against 103,724 tons in the last half of 1905, an increase of 31,574 tons. In the first half of 1905 the production was 68,378 tons.

Furnaces in Blast.—On June 30, 1906, Canada had 15 completed blast furnaces, of which 12 were in blast and three were idle. Of this total 11 were equipped to use coke and four to use charcoal. In addition one coke furnace was being built on June 30. Three coke furnaces were also partly erected on the same date, work on which had been suspended for some time. One coke furnace was also projected at the close of June, ground for the foundations of which is to be broken at once.

During the first half of 1906 the total number of furnaces in Canada actually in blast for the whole or a part of the period was 13, of which 10 used coke and three used charcoal. The number of furnaces that were idle during the whole period was two, of which one used coke and the other used charcoal when last in blast.

Youngstown Sheet & Tube Co.—In the description of the plant of the Youngstown Sheet & Tube Co., published Aug. 2, in THE IRON TRADE REVIEW, credit for the engineering of the puddle mill, sheet mill, 20-inch skelp mill and tube works was inadvertently omitted. This work was done by S. V. Huber & Co., Pittsburg.

TRADE EXPANSION

Noted in Returns of Canada's Foreign Commerce For Last Fiscal Year.

(Special Correspondence.)

Toronto, Can., Aug. 13.—Returns of Canadian foreign trade for the fiscal year ended June 30, show a noteworthy expansion in all lines as compared with previous years. The total is over $552,000,000. Exports of domestic manufactures have increased from $21,191,333 in 1904-1905, to $24,561,112.

R. Grigg, who has been commissioned by the British government to examine and report upon the openings for British trade in Canada and the competition it encounters, and to arrange for the regular supply of commercial information to England, is now collecting information in Toronto, after visiting Montreal and Ottawa. He will probably go west to inspect the harvesting operations and familiarize himself with the requirements of the market. His mission will occupy about eight months.

Committees of the directorates of the Defiance Iron Works, Chatham, Ont., and the Toronto Gas & Gasoline Engine Co., have agreed on an amalgamation, each company continuing its local business. The capital of the new company will be $500,000. The Chatham branch will be enlarged and the working force largely increased.

As a result of the recent tests of the process of electric smelting the extensive iron ore deposits at Ironsides, near Hull, Que., which have not been worked for 25 years, are likely to be reopened. Examinations with diamond drills are being made to a depth of 400 feet to test their possibilities in the interest of an American syndicate, which contemplates the erection of electric smelters if assured of an adequate supply of raw material.

Jenkins Bros., Ltd., of New York, valve and joint manufacturers, will erect a branch factory in Montreal. They have secured a site in St. Henri Ward, and H. D. Gordon, the firm's mechanical engineer, is now on the ground arranging details. They expect that the plant will be in operation in the spring, employing about 100 hands at the start.

The Central Ontario railway has a contract to carry 30,000 tons of iron ore from the iron mines of Hastings Co. to Sault Ste. Marie.

The Desmarbeau Plumbers' Supply Co., Ltd., has been incorporated, head office, Montreal, capital, $195,000, incorporators, Joseph A. Desmarbeau, Henri Hebert, Pierre Bilandeau, Hormisdas Hamel and J. B. Robert.

TO REOPEN BENSON MINES.

Plans are on foot to reopen the Benson mine, St. Lawrence county, New York, one of the largest bodies of magnetic iron ore in the world. It is authoritatively stated that the property has not been acquired by a new company and that no negotiations to that end are on foot. The mine which is an open cut has been idle for about six years and has produced upward of 150,000 tons of concentrates running from 64 to 66 per cent metallic iron and low enough in phosphorus for use as Bessemer ore. The ore body is more than 9,000 feet long, from 600 to 800 feet wide and extending to unknown depths. Surface quarrying operations suffice to remove the mineral which without selection runs from 33 to 35 per cent. A bank of ore 1,100 feet long and from 60 to 80 feet high lies exposed upon the surface. Large operations will probably be begun in the near future and with the equipment of a new mill and mechanical appliances at the quarry it is estimated that the cost of concentrates on the cars will not exceed $1 to $1.25 per ton. The property is on a line of the New York Central railroad and it is believed that a rate to Buffalo of $1 per ton can be secured.

Link-Belt Company Merger.—As related in a former issue of THE IRON TRADE REVIEW a number of companies merged to form the Link-Belt Co. These were the Link-Belt Engineering Co., Philadelphia; the Ewart Mfg. Co., Indianapolis, and the Link-Belt Machinery Co., Chicago. The consolidation was effected by the Link-Belt Machinery Co., of Chicago, purchasing the plants and assets of the Ewart Mfg. Co., of Indianapolis, and the Link-Belt Engineering Co., of Philadelphia. It controls three splendidly equipped plants at Chicago, Indianapolis and Philadelphia and the line of manufacture covers the entire field of conveying, elevating and transmission machinery, malleable and machine-made driving chains. The officers of the company are as follows: James M. Dodge, Philadelphia, chairman of board; Charles Piez, Philadelphia, president; Glenn G. Howe, Indianapolis, first vice president; Staunton B. Peck, Chicago, second vice president; S. Howard Smith, Philadelphia, treasurer; P. G. Reid, Philadelphia, assistant treasurer; Dyke Williams, Chicago, secretary; Edward H. Burr, Philadelphia, assistant secretary.

Increased cost of wire netting is proving a heavy burden on Australian farmers. In Victoria the price per ton has raised from $105 to $237.

PROSPERITY IN GERMANY.

Consul J. J. Brittain makes a report from Kiel saying that the highly favorable situation in the various large German iron and steel centers shows no sign of giving place to less profitable conditions.

In Rhenish Westphalia and Lorraine the work in hand demands the exertion of every effort in order to execute the multitude of orders received, and this activity extends to raw materials as well as to the manufactured and semi-manufactured products. The foundries are unable fully to cope with the demand. The export trade cannot be properly pressed or served in consequence of the exceptional requirements of the home market. Prices for iron and iron manufactured goods are therefore continually rising. For May they averaged for puddling iron, $16.18 per ton; steel iron, $16.66; specular iron, $22.03; thomas iron, $16.18; hematite, $19.25, and smelting iron, $16.66 to $18.56.

In the mining industry and market there continues to be seen the same spectacle of active prosperity which has characterized it for several months. The scarcity on the coal market continues. English coal is consequently being readily bought far down into the interior of the country. The outlook in the cotton industry is also regarded as being eminently satisfactory.

The large German electrical engineering works have decided to compose their differences with regard to catering for the Russian demand for electrical cables and wires by amalgamating their rival interests under the style of the United Cable Works of St. Petersburg, with a capital of 6,000,000 rubles ($3,090,000).

German Coal and Iron.—The price situation in the German iron market is reported to be stationary, but the activity in all the departments of trade continues unabated. The production of pig iron in the month of May was 96,700 metric tons greater than in the corresponding month of last year. The recently ratified treaty between Sweden and Germany excludes the possibility of an export duty on Swedish ores before the end of 1910. The reopening of the question of giving export bounties has resulted in a decision of the pig iron sydicate to continue the bounty for another quarter, but its prolongation beyond the end of September is made conditional upon the adoption of a similar course by the coal syndicate. The latter syndicate has already rejected this proposal. The coal syndicate has been compelled to let its seaport customers buy English coal, and is importing it into the Rhine country

BOOK REVIEWS.

"Talks by the Old Storekeeper," by Frank Farrington. Delhi, N. Y. Merchants' Helps Publishing Co. 141 pages. Illustrated. 4½ x 7 inches. Cloth. Supplied by THE IRON TRADE REVIEW for 50 cents.

This book gives, in the form of a series of short stories, considerable advice on the subject of developing and conducting a retail business. While it contains much useful and interesting information to those engaged in buying and selling, it is also interesting reading to those outside of commercial life.

"Things That Are Usually Wrong," by John E. Sweet. New York. Hill Publishing Co. 52 pages. 50 illustrations. 5½ x 7¾ inches. Cloth. Supplied by THE IRON TRADE REVIEW for 50 cents.

This book is mainly a reprint of a series of articles published in *The American Machinist.* It is thought by the author and publishers that it would be found useful to engineering students, machine designers and inventors. The book describes in a few words and with numerous illustrations the common way of building various mechanical devices, including steam engines and various machine tools, such as planers, shapers, lathes, etc. It points out wherein the ordinary method is wrong and suggests changes which would cause the device to render better service. The book is extremely interesting and well worth reading.

"Producer Gas and Gas Producers," by Samuel S. Wyer, M. E. New York. "The Engineering and Mining Journal." 296 pages, 113 illustrations and 22 tables. 6½ x 9½ inches. Cloth. Supplied by THE IRON TRADE REVIEW for $4.00.

This book is a comprehensive treatment of the subject of producer gas and gas producers. It commences with four chapters on the fundamental laws and definitions of physics and applied chemistry, which relate directly to a discussion of producer gas. The following chapters take up the status of producer gas, classification of gas producers, the manufacture and use of producer gas, the efficiency of gas producers, the fuel requirements and history of producers, American pressure and suction gas producers and other types of producers including those for by-product gas, by-product coke oven gas, wood gas, etc. Other chapters discuss gas cleaning, the removal of by-products, the operation and testing of producers, the efficiency and future of a producer.

All these subjects are well treated, the descriptions and explanations being accompanied and elucidated by numerous drawings showing the details and mode of operation. Mathematical discussions are introduced wherever necessary, and the entire subject is treated in a broad manner. A valuable portion of the book is a chapter on reference data, which comprises a large number of tables relating to producers and producer gas compiled from high authorities, and a complete bibliography of gas producers arranged in chronological order from 1841 up the present time.

TRADE PUBLICATIONS.

The Laclede Fire Brick Co., St. Louis, is distributing literature entitled "High Grade Refractory Materials for Lining Rotary Kilns." This deals principally with a bauxite brick and compares its composition, cost and durability to the ordinary fire brick.

C. B. Drucklieb, 152 Read street, New York, has issued a pamphlet entitled "Sandcraft." This consists of a series of notes on connecting and operating the injector sand blast apparatus. This apparatus is made in four sizes, ranging in capacity from 300 to 2,000 pounds of sand.

The Oswego Boiler & Engine Co., Oswego, N. Y., in bulletin No. 40, describes a line of circular black steel tanks for gas, gasoline, air and water, and for use as blow-off, receiving, drip pressure, and hot water tanks. The tanks listed range from 18 inches to 60 inches in diameter, and in capacity from 40 to 3,807 gallons.

The Rockwell Engineering Co., 26 Cortlandt street, New York, is distributing Catalog F, describing the Rockwell fuel oil burning appliances. These include high pressure and low pressure oil burners, the Rockwell fuel oil pumping system, both steam actuated and belt driven, positive pressure blowers, fuel oil burners, plates, tanks, hose, etc.

The Globe Machine & Stamping Co., Cleveland, describes the improved Globe oblique tilting tumbling barrel in an attractive catalog recently issued. This tumbling barrel may be tilted in order to discharge its contents and will run in any position from vertical to horizontal. It is made in six sizes ranging from 8 x 14 inches to 20 x 28 inches. The catalog is handsomely printed in colors and well illustrated.

The Bruce-Merriam-Abbott Co., Cleveland, builder of gas engines, is distributing a handsome 30-page catalog, which describes the gas engine made by this company in all its details. The various parts are illustrated by detailed photographs and the reading matter makes clear the operation of each. The engines listed range from 12 to 100 horsepower, and are of the twin cylinder throttling type, operating on the four cycle principle.

Securities Market is Moderately Active.

This is the season of the year at which the general business situation is most strongly influenced by crop conditions. In this connection the government crop report, issued late in the week, is interesting as forecasting new high records in both corn and wheat yields. The fact that bumper crops will be harvested in $4,000,000, only served to show the strength of the market in that comparatively little attention was directed to the failure. In fact, stocks recorded advances both on the date the failure was announced and the day following. In spite of these favorable circumstances, however, Wall street continued its recently developed policy of refusing to reflect prosperity reports in full measure and dealing throughout the week was only moderate with net changes in most cases small. Steel common was fairly well dealt in and netted an advance of almost two points. Colorado Fuel & Iron also gained, but in other cases industrial securities did not find general favor and were little disturbed. The New York Central 3½ per cent bond syndicate was dissolved during the week, and this security broke sharply on Wednesday. On the following day all loan rates advanced to 5 per cent on the New York exchange and continued high through the week. On Saturday bank statements showed large losses in reserve.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation Aug. 4	Closing Quo. Aug. 11	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Pay.
Allis-Chalmers Co	17⅛	16⅝	−1	Sept.	100	19,820,000	.....	.....	.....
Allis-Chalmers preferred	49	45	−4		100	16,150,000	7 cum	.....	Feb., 1904
American Can	7⅛	7½	+ ⅜	Apr. 24	100	41,233,300	.....	.....	.....
American Can preferred	59⅝	57¾	−1⅞		100	41,233,300	7 cum	5 Q.	July, 1906
American Car and Foundry	37¾	38½	+ ¾	June 28	100	30,000,000	.....	.....	May, 1905
AmericanCar and Foundry preferred	100½	100½	.....		100	30,000,000	7 n. c.	7 Q.	July, 1906
American Locomotive	68¾	69	+ ¼	Oct. 16	100	25,000,000		1¾	July, 1906
American Locomotive preferred	113½	113	− ½		100	24,100,000	7 cum	7 Q.	July, 1906
American Shipbuilding	55½	65½	+10	Oct. 2	100	7,600,000	4 n. c.	1 Q.	Aug. 1906
American Shipbuilding preferred	106	107¾	+1¾		100	7,900,000	7 n. c.	1¾ Q.	Aug. 1906
American Steel Foundries	11¾	10⅜	−1⅜	Oct. 3	100	17,700,000	.....	.....	.....
American Steel Foundries preferred	45¾	44	−1¾		100	17,700,000	6 cum	.....	Aug., 1905
Barney & Smith	65	65	.....	June 5	100	1,000,000	.....	.....	June, 1894
Barney & Smith preferred	135	140	+5		100	2,500,000	8 cum	8 Q.	June 1906
Bethlehem Steel	22¾	21	−1¾	April 3	100	15,000,000	.....	.....	.....
Bethlehem Steel preferred	85	85	.....		100	15,000,000	7 n. c.	7 Q.	Aug., 1906
Bullock Electric preferred	111	111	.....	Oct. 2	100	1,000,000	6	6 Q.	July, 1906
Cambria Steel	34¼	34	− ¼	March 20	50	45,000,000	6	3 Q.	Aug., 1906
Cambria Iron	49½	49½	.....		50	8,468,000	4	4 S. A.	Apr., 1906
Colorado Fuel & Iron	51⅛	53⅜	+2	Oct. 15	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	18	18	.....	May 31	100	6,098,000	5	.....	Nov., 1902
Crucible Steel	123⅛	123¼	+ ⅛	Oct. 17	100	25,000,000	.....	.....	.....
Crucible Steel preferred	77	77⅜	+ ⅜		100	25,000,000	7 cum	.....	June, 1906
Empire Steel	5	7	+2	Feb. 28	100	2,281,400	.....	.....	.....
Empire Steel preferred	35	38	+3		100	2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	93½	100	+6½	Feb. 20	100	1,000,000	6	6 Q.	May, 1906
Fay & Egan preferred	128½	128½	.....		100	1,000,000	7 cum	7 Q.	May, 1906
General Electric	167	167	.....	May 8	100	48,256,050	8	8 Q.	July, 1906
International Pump	45	44¼	− ¼	June 5	100	12,262,500		2	July, 1905
International Pump preferred	80	84½	+4½		100	8,850,000	6 cum	6 Q.	Aug., 1906
Lackawanna Steel	65	72	+7	March 14	100	34,971,400	.....	.....	.....
Lake Superior Corporation	17	18	+1	Oct. 3	100	40,000,000	.....	.....	.....
Niles-Bement-Pond	130	130	.....	Feb. 7	100	5,000,000	6	6 Q.	Sept, 1906
Niles-Bement-Pond preferred	105	105	.....		100	2,000,000	6 cum	6 Q.	Aug., 1906
Otis Elevator Co	46	51⅝	+5⅝	March 19	100	6,350,300		2 A.	Apr., 1906
Otis Elevator Co. preferred	96	98	+2		100	5,589,500	6 n. c.	6 Q.	July, 1906
Pittsburg Coal Co	15	15	.....	Feb. 12	100	30,135,000	.....	.....	.....
Pittsburg Coal preferred	53	53½	+ ½		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	51	51⅞	+ ⅞	Feb. 21	100	12,500,000		2	Aug., 1904
Pressed Steel Car preferred	99	97½	−1½		100	12,500,000	7 n. c.	7 Q.	Aug., 1906
Pullman Palace Car	238	238	.....	Oct. 18	100	74,000,000		8 Q.	Aug., 1906
Railway Steel Spring	52¼	52½	+ ¼	March 1	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	99¼	98½	− ¾		100	13,500,000	7 cum	7 Q.	June, 1906
Republic Iron & Steel	28	28	.....	Oct. 17	100	27,352,000	.....	.....	.....
Republic Iron & Steel preferred	98½	99	+ ½		100	20,852,000	7 cum	7 Q.	Apr., 1906
Sloss-Sheffield	76	76½	+ ½	March 14	100	7,500,000	5	5	Jan., 1906
Sloss-Sheffield preferred	106	106	.....		100	6,700,000	7 n. c.	7 Q.	July, 1906
Tennessee Coal & Iron	154	154	.....	May 15	100	22,552,800		4 Q.	Aug., 1906
U. S. Cast Iron Pipe & Foundry	48	47¼	− ¾	June 27	100	12,500,000		2	Sept., 1906
U. S. Cast Iron Pipe & Foundry preferred	92½	90¼	−2		100	12,500,000	7 n. c.	7	Sept., 1906
U. S. Steel	39⅛	40⅞	+1⅞	April 16	100	508,302,500	2 n. c.	½ Q.	Oct., 1906
U. S. Steel preferred	106⅜	106	− ⅜		100	360,281,100	7 cum	7 Q.	Aug., 1906
U. S. Steel 5's	98½	98½	.....		100	463,798,000	5	5 A.	.....
Virginia Iron, Coal & Coke	44½	45	+ ½	Sept. 18	100	8,641,600	.....	.....	.....
Westinghouse Electric	150¾	150	− ¾	June 27	50	20,996,350	10	10 Q.	July, 1906
Westinghouse Air Brake	145	145	.....	Oct. 2	50	10,990,450	20	20 Q.	July, 1906

all lines this fall, however, has been discounted for some time and reports to this effect stimulate the market but little. In other particulars conditions are equally satisfactory. Fifty-three railroads for the fiscal year have increased their net earnings 21.34 per cent. Substantial gains are also shown by bank clearings in the larger cities and the iron, steel and manufacturing industry continues its record activity. Two disturbing factors entered into the market of the past week, though one of them, the unsettled condition of Russian affairs, exerted less influence than usual and showed considerable improvement. The other, the closing of the Milwaukee Avenue State Bank of Chicago with liabilities in excess of

The Niles-Bement-Pond Co. has declared the regular quarterly dividend of 1½ per cent on preferred stock, payable Aug. 15. On common stock the regular semi-annual dividend of 3 per cent has been voted, payable half on Sept. 20 and half on Dec. 20.

Minority stockholders of the Central Foundries Co. have started an agitation to secure further enlightenment on the operations of that company. Proxies for the annual meeting to be held in Jersey City, Aug. 24, are sought by a committee representing these interests.

The Colorado Fuel & Iron Co. has made application to the New York Stock Exchange to list $2,000,000 additional common stock, and $4,000,000 addition of the first mortgage and collateral trust 5 per cent series B bonds of the Colorado Industrial Co.

For lake freighters under construction or contracted for, it is estimated that Cleveland banks will be called upon for about $10,000,000.

NEWS FROM MANY INDUSTRIES.

New Buyers:

The Shenandoah Steel Wire Co., West Seneca, Erie county, N. Y., has been incorporated with a capitalization of $1,500,000 by Arthur S. Kittle, John F. Charlton, New York City; W. F. Holt, Palisade, N. J.; Wm. MacBain, Closter, N. J., and R. N. Tomlins, Brooklyn.

The Terre Haute Malleable & Mfg. Co., Terre Haute, Ind., has been organized with a capital stock of $55,000 to conduct a business of general foundry work and to manufacture stoves as a specialty. The incorporators are: A. J. Wagner, Henry J. Warner, Terre Haute; E. A. Briggs, Chicago, and M. O'Learey, B. Smith and E. A. Biggs, Chicago.

The Salem Sashweight Foundry, Inc., Salem, Mass., has been incorporated with a capital of $2,000 to deal in sashweights and do a general foundry business. The incorporators are: Horace N. Smith, Alonzo H. Smith, Salem, and Addison S. Hodges, Somerville.

The Connecticut Automobile Co., New Haven, Conn., has been organized with a capitalization of $10,000 to engage in the manufacture and sale of automobiles and bicycles. The incorporators are: Jeremiah C. Smith, Thomas Whitfield and David E. Fitzgerald.

The LaGrange Foundry Co., Quincy, Ill., has been incorporated with a capital stock of $15,000 by John Willis Gardner, Melvin D. Cheesman and Joseph William Wall.

The Marion Mfg. Co., Marion, O., has increased its capitalization from $400,000 to $1,000,000.

Stewart & Bruckner, Nashville, Tenn., have been incorporated with a capital stock of $25,000 to carry on their general machinery business. The incorporators are: J. A. Bredford, John H. Stewart, Lytton Taylor, J. G. Allen and J. D. Kelly.

The Northwestern Pipe & Supply Co., is a new Erie, Pa., corporation. Otto G. Hitchcock is president.

The G. White Axe Co. has been chartered in Pennsylvania, with office at Honesdale. George M. Genung is treasurer.

Raeder & Wood, Great Northern building, Chicago, Ill., have been incorporated for general practice in industrial architecture and engineering, making a specialty of the designing, constructing and equipping of industrial plants. W. E. Wood, mechanical engineer, is president; Henry Raeder, consulting architect and engineer, and E. P. Vose, secretary and treasurer.

The West Coast Steel Co., Los Angeles, Cal., has been incorporated with a capitalization of $100,000 and has begun work on a fabricating plant for structural steel in that city to have a capacity of 15,000 tons a year. The incorporators are. S. B. Harding, Waukesha, Wis.; George B. Harding, S. A. Simon, M. Robertson and B. K. Brodner, Los Angeles.

The Gallipolis Foundry & Machine Co., Gallipolis, O., has increased its capital stock from $25,000 to $30,000.

The Browning Engineering Co., Cleveland, O., has raised its capitalization from the nominal figure of $25,000 to $500,000. No changes or extensions are to be made.

The New York State Steel Co., Buffalo, N. Y., has increased its capital stock from $1,000,000 to $2,500,000.

The Indianapolis Excelsior Machinery Co., Indianapolis, Ind., has been organized with a capitalization of $10,000 to manufacture machinery. The incorporators are: Henry Rosenberg, Emma Rosenberg, Charles Herderich and Lizzie Herderich.

The Toledo Metal Fixture Co., Toledo, O., has increased its capital stock from $10,000 to $25,000.

The Cold Process Steel Co., New York, has been incorporated with a capitalization of $600,000 by S. C. Entwistle, Jamestown, N. Y.; C. C. Carroll, New Haven, and A. F. Reid, New York.

The Southern Car Co., High Point, S. C., has increased its capital stock to $150,000, will enlarge its plant and increase its capacity.

A number of Pittsburg capitalists have incorporated the Pittsburg Pneumatic Co. with a capitalization of $250,000 to manufacture pneumatic tools. The officers are: Frank M. Faber, president; Charles H. Johnson, treasurer, and Charles C. Murray, secretary.

The Foundry Specialty Co., Cincinnati, O., has been incorporated with a capitalization of $10,000 by Frederick, William and Emilie Weissman, Herman T. Kohnstedt and Chas. J. and Vera Goehringer.

H. R. Romberger and others of Winona, Miss., have organized a company with a capital stock of $25,000 to erect a foundry and machine shop.

The Dischinger Copper & Iron Works Co., Cincinnati, O., has been organized with a capitalization of $30,000 by Ottoe Dischinger, E. G. Schutte, Anthony Neutzlinger, Henry L. Rockel, Walter C. Taylor.

The Steinle Turret Machine Co., Madison, Wis., has been incorporated with a capital stock of $60,000 by G. A. Steinle, J. A. Steinle and William R. Bagley.

The Ornamental Grill Mfg. Co., 16-18 East Mitchell street, Atlanta, Ga., has been organized for the purpose of manufacturing all manner of high-grade machine work by J. T. Riddell, Charles F. Riddell and T. M. Walker.

Moses Morgan, John F. Morgan, John Thomas, D. Davis, of Jackson, O., and H. H. Hossman, of Portsmouth, O., have incorporated a company to build and operate a blast furnace a few miles west of Jackson, O. H. H. Hossman is engineer. This is the project recently mentioned in THE IRON TRADE REVIEW.

The Lawrence Sand, Lime & Brick Co., New Castle, Pa., has been incorporated by T. P. Williams, L. M. Uber, New Castle, and R. L. Davis, Wampum, Pa.

A large plant for the manufacture of steel hoops, cotton ties and bands will be erected at Niles, O., by a new company which is now capitalized at $300,000, and expects to double this amount. Milton Coombs, formerly connected with the Carnegie Steel Co., Charles S. Thomas and Wade Taylor are interested in the new company.

The Ireland Machine & Foundry Co. has been incorporated with a capital stock of $25,000 to manufacture machines, tools and implements. The incorporators are: A. Burtsell Ireland, Frank L. Ireland and Herbert A. Ireland, all of Greene, N. Y.

The American Forge & Iron Co. has been chartered in Pennsylvania with David H. Gallen, Wilkesbarre, as treasurer.

The Canada Metal Co., Ltd., Toronto, has been incorporated with a capital stock of $100,000 by William G. Harris, Frederick Harris and William G. Harris, Jr.

The Berlin Machine Works of Canada, Ltd., Hamilton, Ont., has been incorporated with a capitalization of $500,000 by Porter B. Yates, Louis D. Forbes, Franklin L. Lane, John Patterson and Sanford D. Biggar.

The Steel Fence Post Co., Ltd., Toronto, has been incorporated with a capital of $40,000 by Henry Buckel, Thomas Patterson, Charles A. Brink, Donald Malloy and Evodius Buckel.

The A. M. Lunt Burner Co., Boston,

has been incorporated to manufacture engines and burners. The capital stock is $200,000 and the officers of the company are: President, I. C. Ogden, No. 20 Pearl street, Malden, Mass.; treasurer, A. M. Lunt, No. 47 Savin Hill avenue, Boston, Mass.; clerk, A. P. Aechtler, No. 47 Savin Hill avenue, Boston, Mass.

The James H. O'Brien Scale & Supply Co. has been chartered with a capital stock of $25,000 to manufacture machinery, scales and weighing apparatus: The incorporators are: James H. O'Brien, 90 Berrman street; J. Edward O'Donohue, 190 Hewes street; John D. Carroll, 120 Arlington avenue, Louis L. Hopp, Jamaica avenue and Elton street and John F. Reilly, 338 Hart street, all of Brooklyn.

New Construction:—

The Coe Brass Mfg. Co., Torrington, Conn., will build a new machine shop.

The York Street Railway Co. will build a large car barn and repair shop at York, Pa.

The United Wire & Supply Co., Providence, R. I., is to build an addition to its plant.

The Cocheco Cotton Mfg. Co., Dover, N. H., is to build a machine shop 60 x 150 feet.

The Corp Iron Works, Hutchison, Kan., is seeking a new site at that place and may build.

The Santa Fe railroad will add a planing mill and car repair shop to its works at Peublo, Col.

A one-story pattern shop 83 x 144 feet is to be built by C. P. and J. L. Lauson, at Milwaukee.

The Kelly & Taneyhill Co., Waterloo, Ia., manufacturing drills, is to erect a new factory building.

Hemmingway & Son, Lynn, Mass., have let the contract for a two-story machine shop to cost $6,000.

The Greaves & Klusman Co., Cincinnati, has been granted a permit for a one-story brick pattern shop.

Clarence H. Josslyn, Lawrence, Mass., has under construction foundry buildings which will cost about $60,000.

The Chattanooga Railways Co. is building new car shops of brick, concrete and steel construction at Chattanooga, Tenn.

The New York State Steel Co., Buffalo, N. Y., has prepared plans for a $12,000 office building of stone and brick construction.

The Niles Tool Works Co., Hamilton, O., is making preliminary plans for machine shop, foundry and blacksmith shop extensions, and will be pleased to receive circulars, catalogs, etc., pertaining to the extension and equipment of same.

The Scullin-Gallagher Iron & Steel Co., St. Louis, Mo., has taken out a permit for a steel foundry building 60 x 280 feet to cost $15,000.

The La Crosse Boiler Co., La Crosse, Wis., is preparing plans for a new brick factory building as an addition to its present north side plant.

Coatesville, Pa., has the report that a branch of the American Locomotive Co. may be located there. Visits have been made by officials and surveys started.

The Marshall Electric Mfg. Co., Boston, Mass., is to build a concrete, fireproof manufacturing plant during the fall. Considerable machinery will be required.

The United Wire & Supply Co., Providence, R. I., will add a two-story brick structure 72 x 105 feet to its present plant. All machinery will be driven by separate motors.

The Peerless Motor Car Co., Cleveland, O., states that it is in no wise connected with the Detroit plant reported planned by the Peerless Automobile Co., of Buffalo.

The Phoenix Wire Works, Detroit, Mich., manufacturing woven wire, grills, gratings, screens and fencing, is erecting a new factory which it will occupy during the fall.

The Pennsylvania Steel Co. has installed a number of improvements at its merchant and billet mills at Steelton, Pa., including a new hot bed system at the latter department.

The Knox Automobile Co., Springfield, Mass., is preparing plans for a four-story brick addition 50 x 225 feet to be used for machine departments. Considerable equipment will be needed.

The Hayden-Corbett Chain Co., Columbus, O., has let contracts for extensive additions which will double the capacity of its plant. These will be built out of the surplus of the company.

The Eastern Expanded Metal Co., Paddock building, Boston, has secured a site in Cambridge, and will erect a reinforced concrete factory building which it expects to have completed by Nov. 1.

The Gilson Engine Co., Port Washington, Wis., is to establish a Canadian branch, and is negotiating with Berlin and Woodstock, Ont., regarding a site and assessment concessions.

The Prospect Yacht, Gas Engine & Launch Co., will build a plant near Chester, Pa., this year. It has $100,000 under a New Jersey charter and H. E. Dautzehocher, Philadelphia, is president.

The James Brown Machine Co.'s plant, Pawtucket, R. I., has been sold to a Boston syndicate, and it is reported will build a duplicate of the present structure and will operate the entire plant.

The L. S. Starrett Co., Athol, Mass., is building an addition to its plant 35 x 288 feet, four stories high. The structure will be fitted with automatic sprinklers, fireproof doors and other up-to-date improvements.

The National Radiator Co., Johnstown, Pa., is making extensive improvements to its plant to take care of its rapidly growing business. The new additions will increase the capacity of the works about 40 per cent.

Wilcox, Crittenden & Co., Middletown, Conn., manufacturing marine hardware, have let the contract for a four-story brick structure 60 x 100 feet to be used as a machine shop, grinding room and for storage purposes.

The Page Boiler Co., Mystic, Conn., has begun the manufacture of boilers, using a part of the foundries of the Standard Machinery Co. The Page Co. has plans prepared for an extensive plant on which bids will be received until fall.

The Spalding-May Foundry & Machine Co., Atlanta, Ga., doing general machinery and foundry work, making a specialty of the manufacture of fertilizing machinery, has erected new works on the Southern Railroad Belt Line, just outside the city limits.

The Rampo Iron Works is to establish a branch at Niagara Falls, Ont., where it has secured a site of 13 acres between the Wabash & Michigan Central railways. The municipal council will give a $3,000 bonus and a fixed assessment of $1,000 on the site for ten years.

The Albion Malleable Iron Co., Albion, Mich., will build a foundry 252 x 526 feet, install six furnaces and double its output, enabling it to employ 300 molders. The company was incorporated in 1889 and has been turning out a general line of malleable castings.

The Colorado Fuel & Iron Co. is completing blast furnace F, Pueblo, Col. Work on this furnace was commenced about four years ago, but some time ago was stopped and nothing was done until recently when instructions were given to rush the plant to completion.

For its temporary plant now under construction the G. H. Bushnell Press Co., Thompsonville, Conn., will require generators and motors. Automobile pipes and radiators will be manufactured for the present and as soon as the larger building, planned for con-

struction next year, is completed, bent and coiled pipe of all sizes will be turned out.

Improvements for which contracts have been let by the Fanner Mfg. Co., Cleveland, O., include one building 135 x 400 feet to be used as a malleable and gray iron foundry and a structure 75 x 350 feet to be used for power, annealing and assembling purposes. In this new foundry the company will employ about 240 molders. Construction work will be completed in four months.

General Industrial Notes:—

The N. L. Hayden Co., Columbus, O., is preparing to engage in a general machine shop business in addition to its present line of specialties.

The Stimpson Scale & Mfg. Co., Milan, O., is to remove to Northville, Mich., a number of citizens of which have become stockholders.

Edward W. Lynch, of New Haven, Conn., has been appointed temporary receiver of the A. C. Stiles Anti-Friction Metal Co., of that city.

The business of the Crescent Furnace & Foundry Co., Des Moines, Ia., has been purchased by Jesse R. A. Griffith, John N. D. Griffith and A. Griffith.

The Aurora Boiler & Construction Co., Aurora, Ill., is to remove to Canton, O., where it will occupy the old Aultman plant which has been leased for five years.

The Angola Furnace Co., it is reported, will remove from Angola, Mich., to Decatur, Ind., where local capitalists have subscribed for $30,000 worth of stock.

The Cary Inventions Co., Chicago, recently organized to manufacture automatic car and train pipe couplers, is capitalized at $1,200,000 of which $400,000 is preferred.

R. J. Morrison, of New York, has purchased the Plymouth stove foundry, Plymouth, Mass., and will operate the plant which has been closed since the death of the former proprietor.

The Southern Engine & Boiler Works, Jackson, Tenn., has purchased the Jackson Milling Co.'s plant for $12,500. The mills will be closed and the property used for additions.

The foundry department of the Hyrum A. Silver Foundry & Machine Co., Salt Lake City, Utah, recently made its first cast. The plant is a model one and will employ about 100 men.

The Traylor Engineering Co. and the Traylor Mfg. & Construction Co. have been consolidated under the name of the Traylor Engineering Co., with a capitalization of $500,000, of which $500,000 is issued to pay for the properties taken over, the balance remaining in the treasury for future needs. The new company has secured a new and well equipped plant at Allentown, Pa., as well as the large business of the Traylor Engineering Co., 118 Liberty street, New York.

By reason of its sale to the Ohio Elevator & Machine Co., the National Ornamental Co., Columbus, O., will hold a stockholders' meeting, Aug. 25, for the purpose of dissolving the corporation.

Judgment for $35,000 against the King Bridge Co. was recently given in a suit brought by prosecutor of Lorain county, O., charging that an agreement with other companies had been made to permit the King Bridge Co. to secure a contract in return for monetary consideration.

A meeting of creditors of the Consolidated Mfg. Co., Toledo, O., was held at the Boody House, in that city, Tuesday, to consider the affairs of the company and the possibility of its reorganization. It has been operated since May under the direction of David Robison Jr., as receiver.

The Truxal & Painter Machine Co., Chattanooga, Tenn., will make a specialty of an hoisting engine for brick and concrete contractors which operates by a new mechanical movement and it is claimed affords reliability and simplicity coupled with a low original cost and small operating expenses.

Stockholders of the Etna Steel & Iron Co., Etna, Ga., have elected the following officers: T. N. Barnsdall, of Pittsburg, president; W. B. Lowe, 42 Broadway, New York, vice president and general manager; S. Harrison, of Cedartown, Ga., secretary-treasurer, and A. T. Hamilton, of Etna, local manager.

The Columbus Chain Co., at the recent annual meeting, reported the best year in its history, and plans for further enlarging the works were considered. The following officers were elected: Charles M. Wambaugh, president and treasurer; I. B. Cameron, vice president; Scott A. Webb and Henry P. Ford, secretaries, and Daniel Carroll, superintendent.

The J. G. Brill Co., Philadelphia, which has been incorporated at Harrisburg, Pa., with a nominal capitalization of $50,000, will take over the car building plants now owned by the Brill interests. These include the works at Philadelphia, the American Car Co.'s plant at St. Louis, the John Stephenson Co.'s plant at Elizabeth, N. J., and the Kuhlman plant at Cleveland, O. The fifth plant located in Massachusetts will also be taken over and the present capitalization of the company will be largely increased.

Fires and Accidents:—

The Ft. Wayne Foundry & Machine Co., Ft. Wayne, Ind., sustained a loss of between $5,000 and $10,000 July 30, when the plant was visited by fire. Heavy damage was done in the pattern storage room.

Part of the new tank shop recently erected by the American Locomotive Works, at Scranton, Pa., was blown down July 29. The fact that it was Sunday and that few men were at work prevented possible loss of life.

The plants of Delano Machinery Co., and the J. S. McDonald Machinery Co., Chicago, were destroyed by fire Aug. 8, and neighboring plants of E. G. T. Colles & Co., the W. H. Lucas Machinery Co., the Edwards Machinery Co., the McIntosh Machinery Co., the Domestic Plating Co., and the Turner Machinery Co., were badly damaged. The loss aggregates $150,000.

Trade Notes:—

The Wabash railroad is expending over $3,000,000 for new cars and engines for delivery during late summer and fall.

The Pacific Coast Hardware & Metal Association has established offices in the Monadnock block, San Francisco. Eugene Goodwin is secretary.

The American Ship Building Co. has closed a contract with the Hawgood interests for a 10,000-ton freighter to be ready April 15, 1907. This boat is the second of that class ordered by these interests this year, and will give them eight first-class steel steamers of the season. The American Ship Building Co. now has 20 freight steamers under contract for fall and spring delivery.

The Canton Pump Co., Canton, O., forwarded the past week a carload of pottery machinery, consisting of filter press, blunger mill, pug mill, slip pump, etc., to a large pottery firm at Red Wing, Minn.

The De La Vergne Machine Co., New York, reports the following recent orders for "Hornsby-Akroyd" oil engines: Wheaton Seminary, Norton, Mass., 13 horsepower; P. R. Mfg. Co., Detroit, Mich., 50 horsepower; Rahr Brewing Co., Oshkosh, Wis., 32 horsepower; the Vitagraph Co., Brooklyn, N. Y., 25 horsepower; Regal Oil & Gas Co., Chicago, Ill., 65 horsepower; L. R. Wright, Pecos, Tex., 13 horsepower; Jas. H. Holden, Fall River, Mass., 75 horsepower; Borough of Souderton, Souderton, Pa., 50 horsepower; James L. Breeze, Southampton, L. I., 35 horsepower, direct connected to 25-kilowatt generator.